



Exploring digital payment use cases through a merged dataset: **Nigeria pilot study**

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Established by



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About insight2impact

insight2impact is a resource centre that aims to catalyse the provision and use of data by private and public-sector actors to improve financial inclusion through evidence-based, data-driven policies and client-centric product design.

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1. Executive summary

This project piloted an innovative research method combining traditional demand side research instruments, in the form of face-to-face surveys, with transactional data generated by the Nigeria Central Switch's inter-bank settlement system (Nigeria Inter-bank Settlement System or NIBSS).

The analysis of transactional data generated by NIBSS leverages Nigeria's bank verification number (BVN), a unique customer identifier which is reported together with bank account details for every transaction processed by NIBSS. Because NIBSS processes several billion transactions for over 36.5 million BVNs each year, the analysis was conducted on a randomly drawn sample of one million BVNs. For each of these BVNs a full transaction history ending in December 2017 was extracted, covering various payment platforms supported by NIBSS. These include point-of-sale (POS), electronic funds transfers (NEFT), cheque payments and instant payments (NIP). Because NIBSS is a switch, it sees a subset of the transaction activity for any account holder; only inter-bank debit and credit transactions are processed through its platforms and no balances are available. In addition, there is no data on cash withdrawals. Aside from transactional data, some demographic data is gathered during the BVN registration process including age, gender, contact details and location at the time of BVN registration.

In addition to transactional data, the project team analysed demand-side survey data collected by insight2impact during November and December 2018. A sample of 1,339 adults aged 18 or over were interviewed in urban centres in Lagos and a further 1,058 in Kano states. Along with various demographic and contextual indicators, the survey explored payment use cases in particular to assess adoption of digital payment solutions. In addition, a further 611 respondents selected off the NIBSS sample were interviewed. For these respondents, survey data providing rich context as well as useful reported payments behaviour together with a sub-set of actual payments data generated by NIBSS is available, although the data is not contemporaneous; transactional data terminates at the end of 2017 while the survey data was collected at the end of 2018.

Key findings

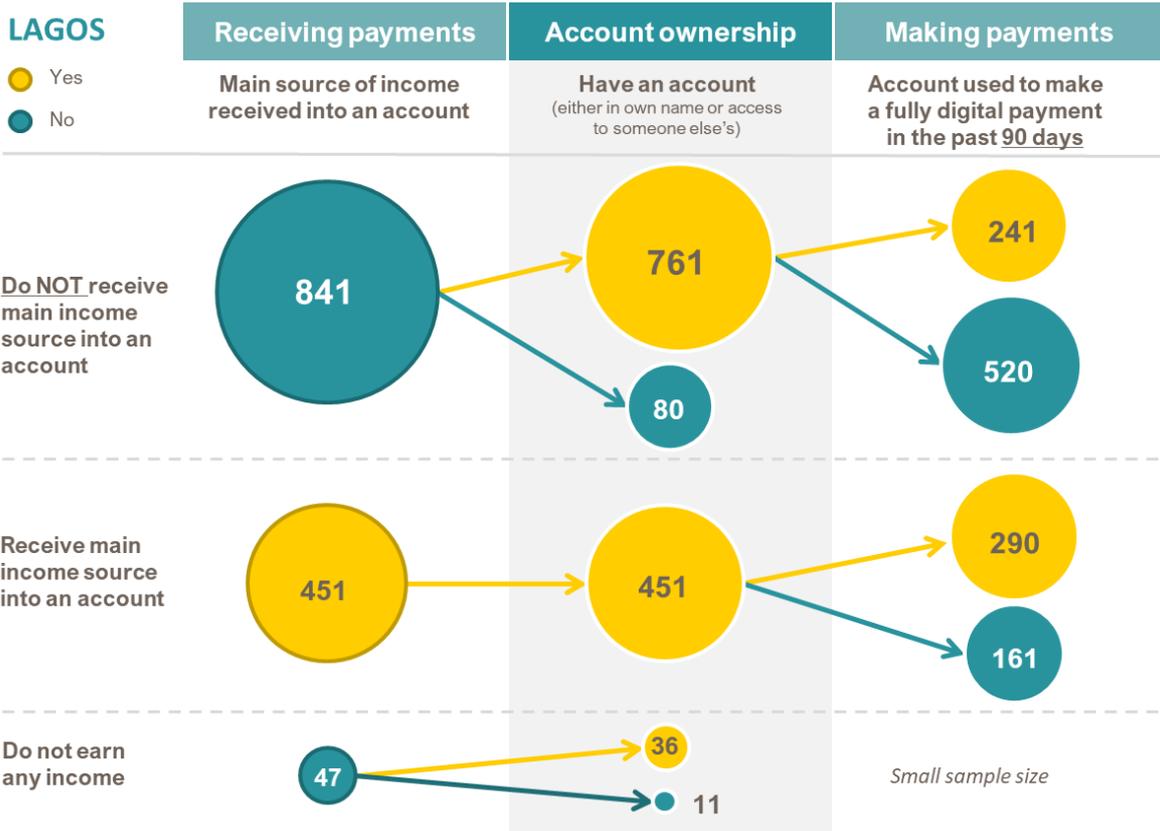
In line with other data, the demand side survey found relatively low adoption of digital solutions either for receiving income or making payments. Only 35% of respondents in Lagos and 17% in Kano report receiving their main source of income directly into an account. Unsurprisingly, formal salaries and government-to-person (G2P) payments are mostly, although not fully, digitised. While there is some scope to digitise these payments further, to drive digital adoption meaningfully across the Nigerian economy other income streams will need to be digitised, notably along the agricultural value chain and for small business owners.

Those who receive their main source of income digitally are significantly more likely to have made at least one fully digital payment¹ in the past 90 days than those who receive their

1 A fully digital payment is one where the store of value is digital and the payment instruction is issued over a digital channel. Digital channels include mobile phones, the internet, POS devices and ATMs.

incomes in cash. Perhaps noteworthy is the proportion of those who receive their incomes in cash only who report making at least one fully digital payment. Of those who do not receive their main income into a digital store of value, 28% in Lagos and 17% in Kano go on to make a digital payment.

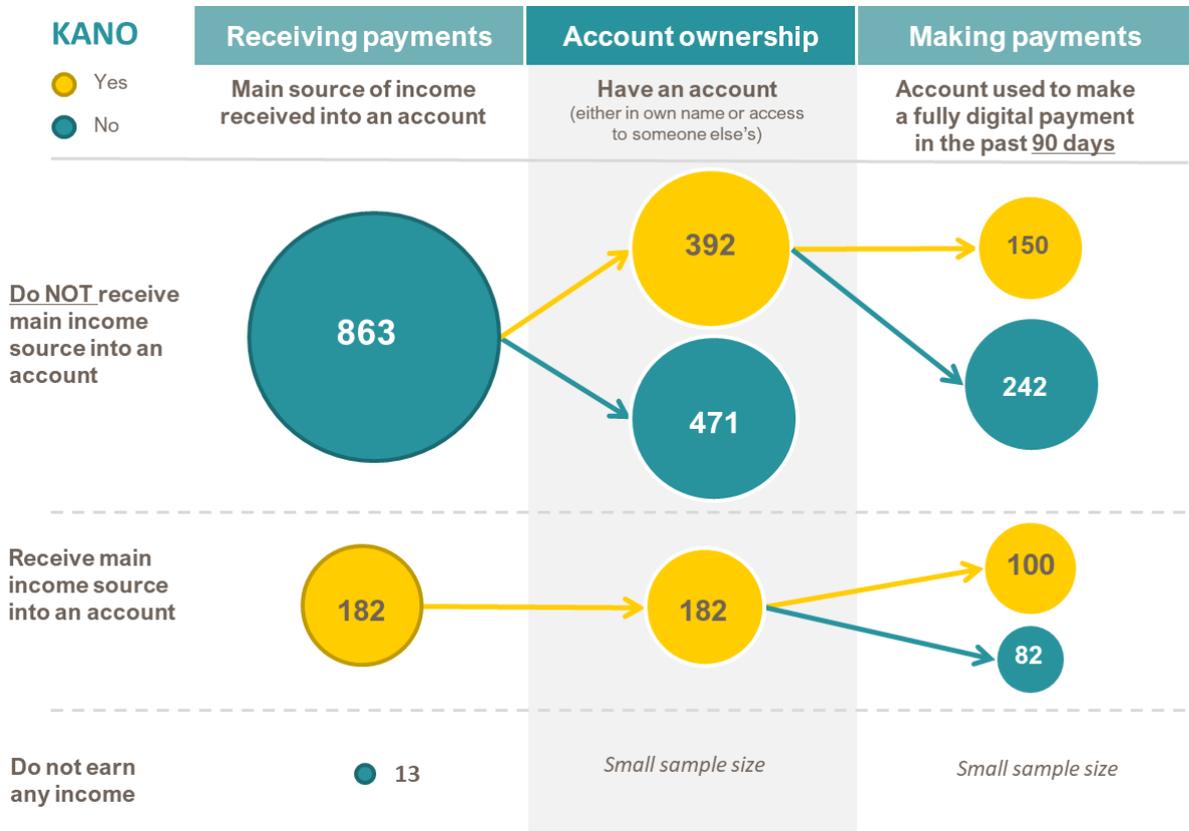
Figure 1: Lagos – Income receipt and making fully digital payments



Source: Non-linked DSS (Lagos)

*Note: Fully digital payments include those made via a digital channel

Figure 2: Kano – Income receipt and making fully digital payments

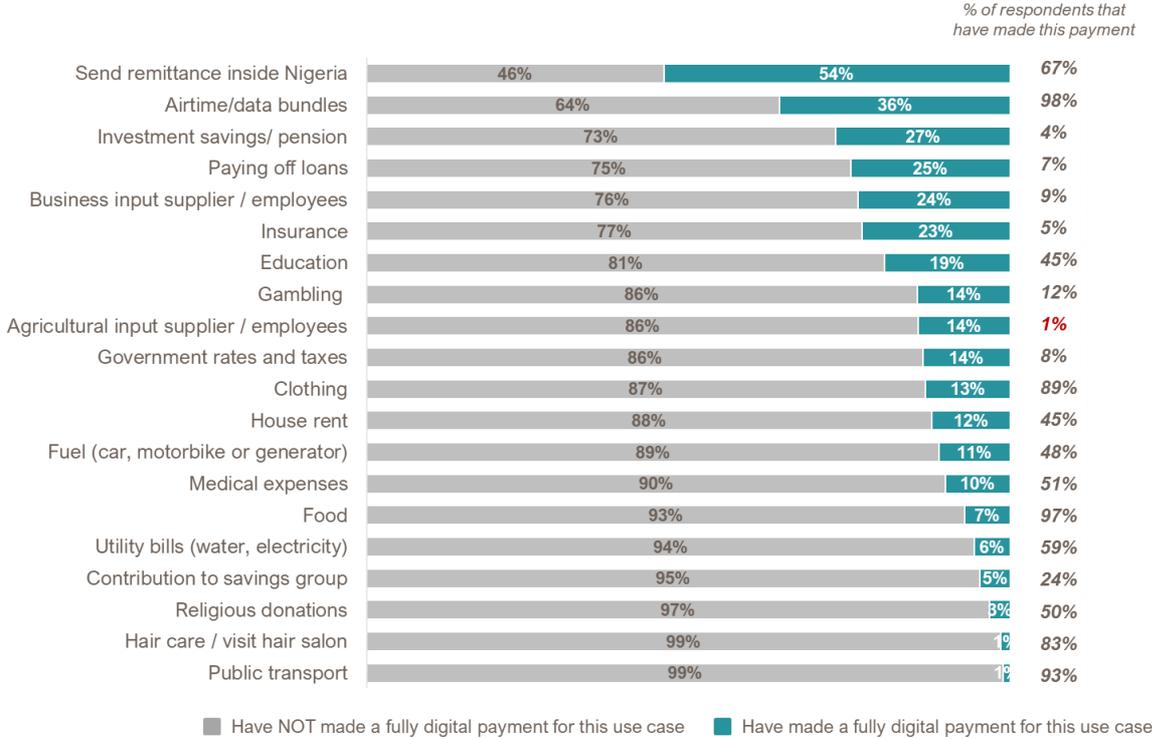


Source: Non-linked DSS (Kano)

*Note: Fully digital payments include those made via a digital channel

Adoption of digital payments differs significantly by use case. Sending remittances and airtime purchases are most likely to have been initiated via a digital channel. There is clearly scope for increased digitisation of these payments. On the other hand, food, clothing, hair care, medical expenses and education are almost always paid for in cash. Encouraging merchants to accept digital payments is clearly a challenge; half the respondents in Lagos and almost two-thirds in Kano indicate that merchants in their areas do not accept digital payments. Of course, this may, in part, reflect merchant perceptions of customer willingness to pay digitally, a “chicken-and-egg” circular dependency inherent in payment innovation.

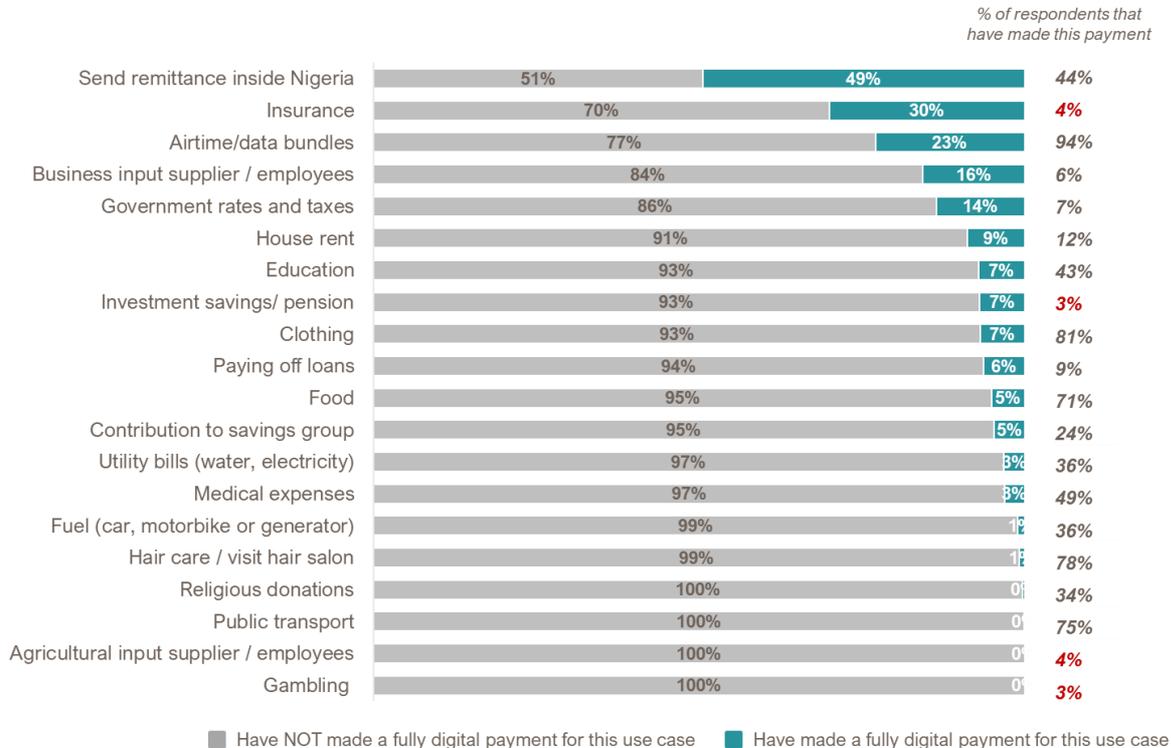
Figure 3: Lagos – Proportion of respondents that have made a fully digital payment by payment use case in the past 12 months



Source: Non-linked DSS (Lagos). Note: Small sample sizes of fewer than 50 highlighted in red

Note: based on “fully” digital payments defined as payments where the store of value AND the payment channel are digital

Figure 4: Kano – Proportion of respondents that have made a digital payment by payment use case in the past 12 months



Source: Non-linked DSS (Kano). Note: Small sample sizes of fewer than 50 highlighted in red

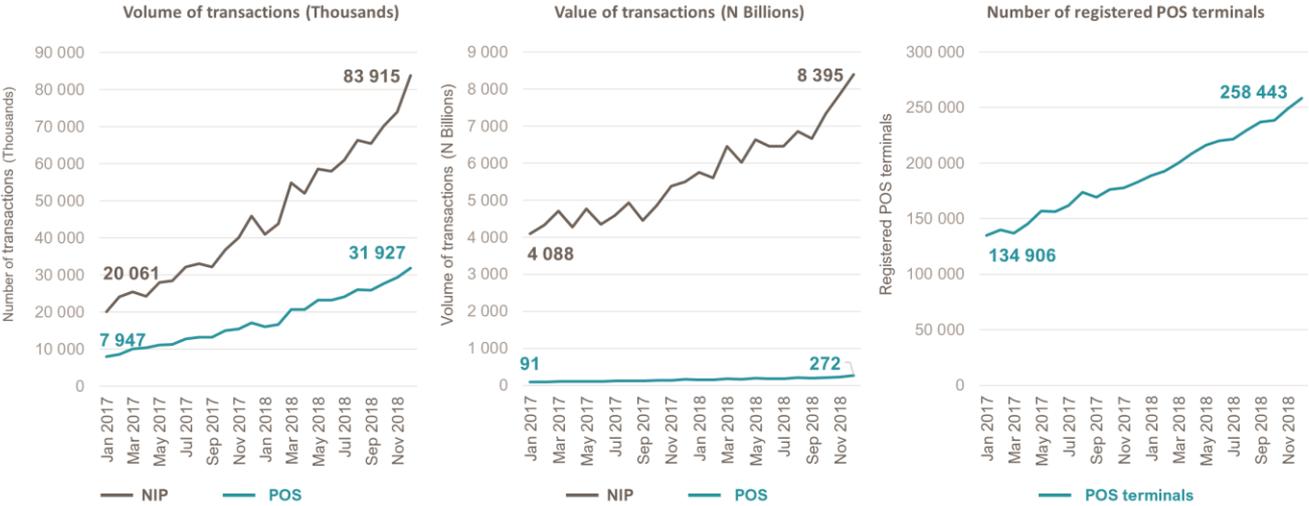
Note: based on “fully” digital payments defined as payments where the store of value AND the payment channel are digital

Overwhelmingly, digital payments are being made via mobile channels, principally USSD² as opposed to POS or ATMs. Many are inter-bank credit transactions that were made using NIBSS’s innovative instant payment platform NIP. This platform was introduced in 2011 and is the only solution of its kind on the continent. Its impact is clear, particularly relative to other digital channels, notably POS. While there has been a noticeable increase in the number and value of POS transactions, as well as the deployment of POS terminals, this is dwarfed by the growth in NIP transactions reported by NIBSS. While POS transactions are free for the customer, the rapid growth in NIP highlights the importance of a low cost³ instant payments solution in driving digital payments.

2 USSD or unstructured supplementary service data allows text messages to be sent over the GSM network using channels that are usually used for voice calls. It is similar to SMS but while SMS messages are stored on the mobile phone USSD runs as a real-time, open session. In addition, USSD is a menu-based service.

3 As per the Guide to Charges by Banks and Other Financial Institutions in Nigeria published by the CBN in 2017 (effective May 2017) user fees on NIP transactions are capped at N50 (equivalent to USD0.16 using the average interbank exchange rate of USD1=N306.77 for February 2019). See <https://www.cbn.gov.ng/out/2017/fprd/guide%20to%20bank%20charges%20circular%20to%20all%20banks%20other%20financial%20institutions%20and%20mobile%20payments%20operators.pdf>

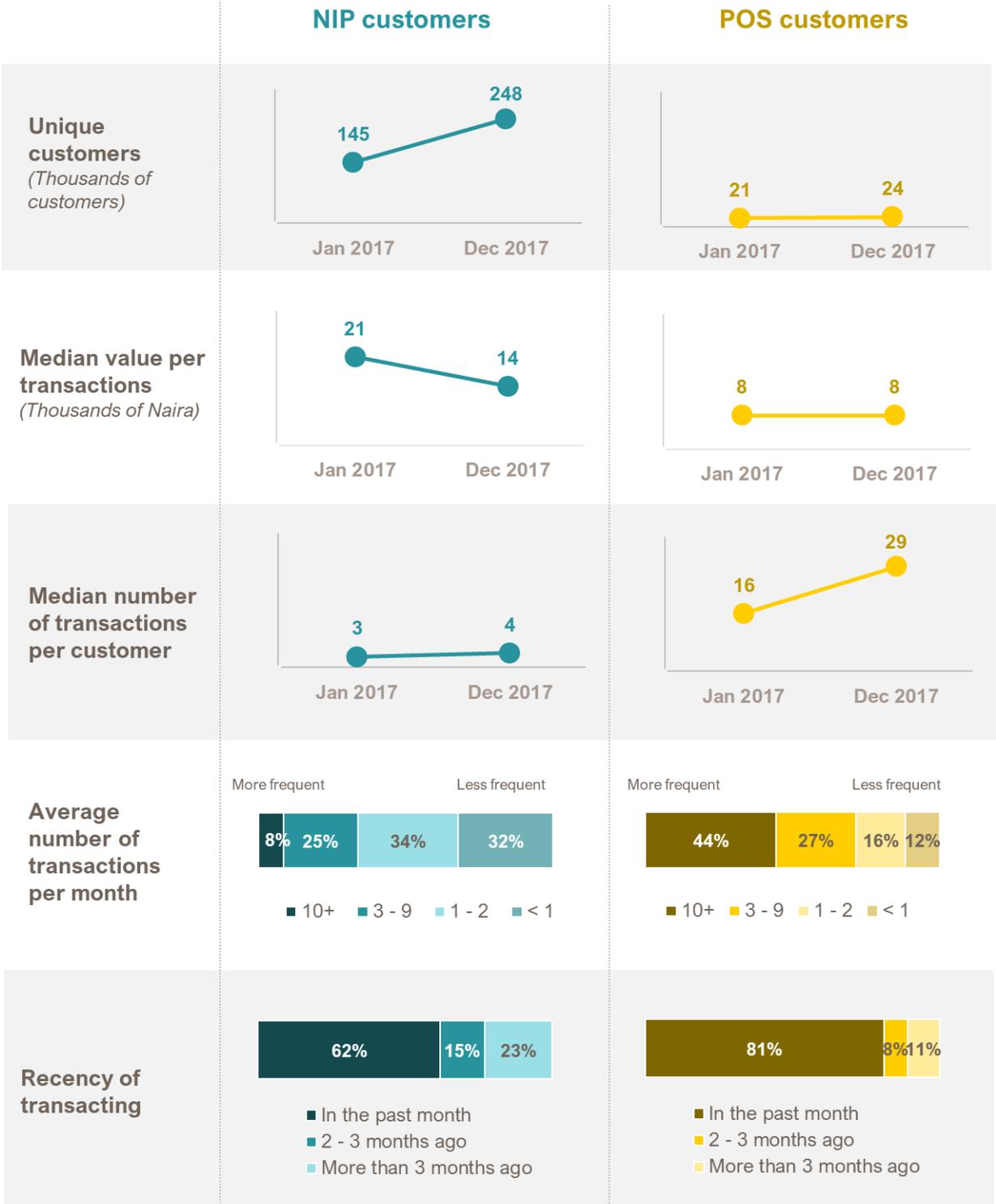
Figure 5: Total volume and value of NIP and POS transactions and number of registered POS terminals (published by NIBSS)



Source: NIBSS Industry Statistics, see: <https://nibss-plc.com.ng/report/>

While the analysis of transaction volumes and values is impressive, the analysis at a customer level demonstrates just how transformative NIP has been. Within the sample of customers analysed as part of this project, there are roughly three times as many NIP transactions as POS transactions, but in terms of customers, there are over ten times as many customers transacting over NIP. In addition, while the growth in the number of POS transactions appears to be driven off an increase in the number of transactions per customer, in the case of NIP, **growth in the number and value of NIP transactions has been driven by new customers**. Despite the growth in deployment of terminals, the number of POS customers transacting each month has remained stable.

Figure 6: Key indicators: NIP vs POS customers (NIBSS data sample)

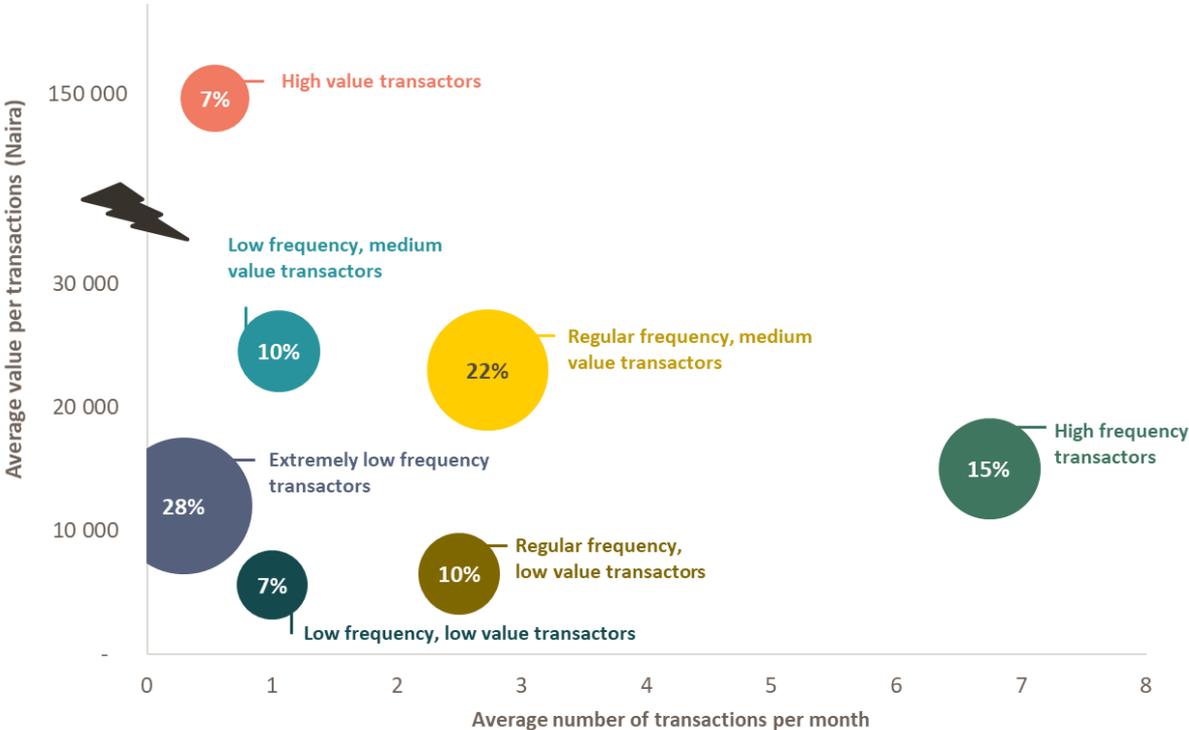


Source: NIBSS data sample

POS customers transact more frequently and are more likely to have transacted within the last month. The median transaction value for POS payments has remained stable over 2017 whereas the **median values of NIP transactions are declining**. On that platform, customers who are first visible in the sample more recently have lower average transaction values than customers who are visible earlier on, an observation that would be consistent with increased inclusion.

Transactional data was used to segment NIBSS customers along two primary dimensions; volume and value of transactions across all platforms. The segmentation clearly identifies a large segment of users who transact infrequently. While this is of course a partial picture which misses many intrabank transactions, notably airtime purchases, it does reflect the very limited usage of digital payments across use cases as per the demand side survey.

Figure 7: Customer segments based on the average value per transaction and the number of transactions per month (bubbles size = proportion of customers that fall into segment)



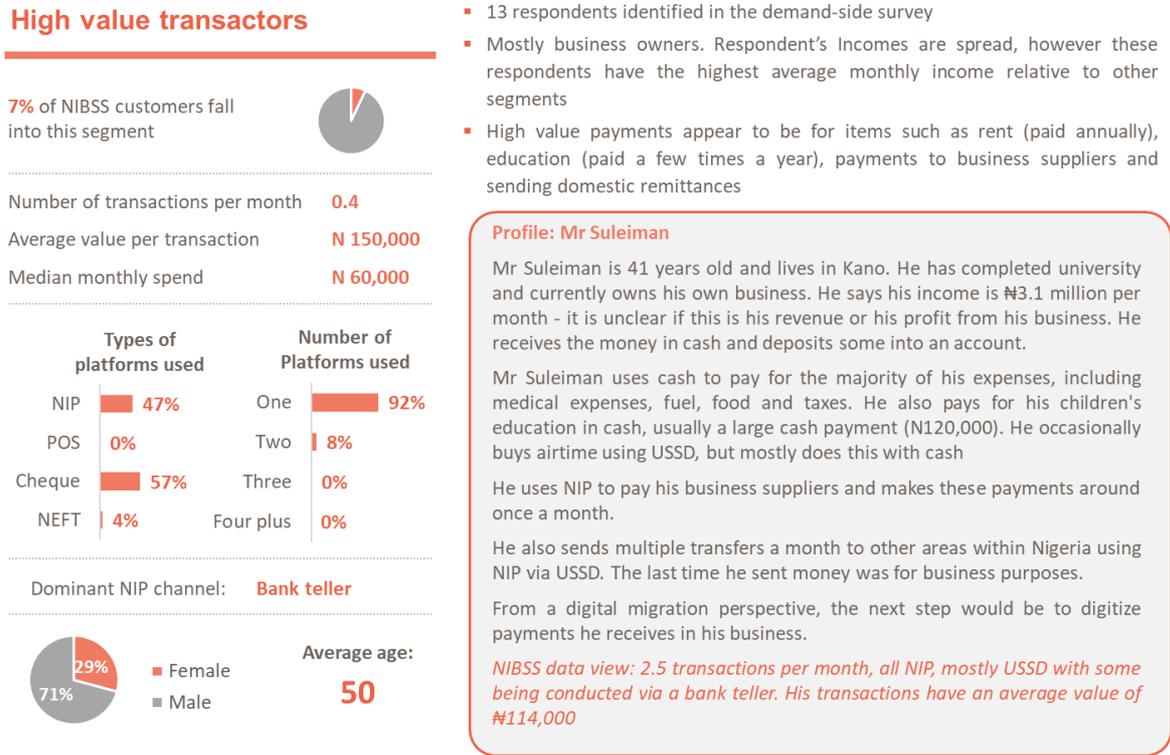
Source: NIBSS data sample

As noted, the NIBSS data provides a fairly limited demographic data restricted to gender, age and location at the time of BVN registration. In order to understand the customer more holistically, and to generate a more complete understanding of their interaction with digital payments, a demand side survey was conducted with 611 respondents that could be linked to the NIBSS. For each of these respondents there is a complete set of NIBSS transactional data and a detailed survey. While one of the original objectives of this component research was to compare *usage data recalled by survey respondents* with *actual transactions*, this comparison did not yield conclusive findings; the surveys were conducted in October and November of 2018 while NIBSS transactional data extends only to end December 2017. In

addition, NIBSS data includes interbank transfers only and therefore does not provide a complete picture of transactional activity.

Nevertheless, the matched sample is a useful addition, helping to reveal customer personas for each segment and explore his or her experiences of and attitudes to the transaction platforms and channels that NIBSS enables. This is in itself a valuable exercise that can build a customer-centric approach within NIBSS and its shareholder banks. To the extent that these institutions perceive there to be value in this approach, it may eventually crowd in further transactional data provided by banks directly. The figure below includes both a NIBSS data view of the high value transactor segment as well as a persona for the segment generated using the demand side survey data.

Figure 8: High value transactor segment profile



Source: NIBSS data sample, Linked demand side survey

That said, the effort required to locate and enlist respondents off NIBSS data was extensive. Of the roughly 4,710 customers selected by NIBSS and contacted by the research house, only 611 participated as respondents in the demand-side survey. Contact details for many customers were out of date and many others who were reached were deeply suspicious of the research, a response that is to be expected in a low trust context where NIBSS has limited consumer recognition and the topic itself is highly sensitive. We would expect banks to have less trouble undertaking similar research; contact-ability should be less of a constraint and customers are more likely to trust banks.

Taking the next step

This analysis is a pioneering piece of work that places the customer at the centre of the analysis. While many questions remain unanswered, it has enabled an understanding of the potential of NIBSS's data to explore behaviour.

It also provides a basis to develop reporting outputs that use the customer, rather than value or volume of transactions, as the primary unit of analysis.

Transactional data can support an evidence-led strategy to drive digital adoption specifically in poorer areas of the country, and to assess the impact of specific interventions that may be implemented. With regard to receiving income, survey data indicates there is some scope to increase G2P payments and payment of salaries in the formal sector. Likewise, with regard to making payments, digitising all P2G payments, including payment for utilities, is an obvious first step. However, in light of the relatively low incidence of these payments, for Nigeria to see broad adoption of digital payments, it must find ways to encourage merchants to accept, and consumers to adopt, digital payments across a range of payment use cases. This is a significant challenge in the absence of compulsion. While it is possible than in some value chains, an adoption strategy can leverage the power of aggregators and financial providers (specifically in credit), if digital payments are to be adopted widely and willingly the digital payments proposition must, in reality, be better than cash. The NIP platform that enables instant transfer of value at low cost, together with mobile channels that enable anywhere anytime transactions subject to network stability, have laid the foundations but there are still clear gaps. One such gap is the limited number of cash-out facilities that would enable convenient conversion between digital and hard currencies; if cash is hard to come by users will be wary of forgoing it, particularly if digital payments are not universally accepted.

The Shared Agent Network Expansion Facilities (SANEF) strategy, which will deploy half a million agents across Nigeria can close this gap. But it is critical that this deployment be guided by good evidence and be closely monitored using transactional data aggregated at an agent and customer level. Given that NIBSS will be the switch that enables interoperability within this network, the data it generates will be critical.

Of course, NIBSS data is not sufficient on its own to monitor adoption of digital payments solutions; as noted it cannot provide visibility on intrabank transactions which are likely significant in an agent-driven model. It is therefore critical that the analysis described in this report be used to crowd in key partner banks and other switches that will play a significant role in facilitating digital payments in Nigeria.

Aside from profiling customers, the richness of transactional data can, inter alia, enable an analysis of digital payment journeys, exploring how those who receive income into an account subsequently transact. It can also enable a better understanding of networks and linkages between customers, a potentially important area for further investigation given that word-of-mouth is likely to be effective in encouraging new users to adopt payment solutions. In addition, it can support the agent strategy directly.

Aside from generating useful findings, the project has demonstrated that an analysis of transactional data is possible without compromising data security or customer privacy. This should allay many of the justified concerns of individual banks. NIBSS could consider

working with the Central Bank of Nigeria (CBN) to develop and publish clear protocols regarding how transactional data is analysed, and how customer data is anonymised. It should also ensure that appropriate disclosure on data usage and clearly worded consent agreements are included when customers sign up for BVNs or bank/mobile money accounts.

2. Introduction

The insight2impact team, in consultation with various stakeholders, has developed several measurement frameworks to assist the financial inclusion community in using data effectively to improve the value delivered by financial inclusion. These studies and measurement frameworks shift the focus away from simply having, or having access to, a financial product or service and explore whether targeted populations derive meaningful benefit from that product or service. These frameworks consider various *needs* and explore how consumers *use* financial services to meet these needs.

Developing indicators based on needs and usage – covering specific use cases together with an indication of recency, frequency and monetary value – is significantly more complicated than generating access and take-up indicators. Gathering data directly from consumers using surveys or diary studies can be time-consuming and expensive. In addition, given the level of detail required, the data is prone to recall error.

An alternative data source is transactional data generated by banks and mobile network operators (MNOs) that operate accounts and wallets, as well as various aggregators and payment switches that enable financial transactions. This data can provide a more accurate, detailed picture of account activity and customer activity where a unique customer identifier exists.

There are often barriers to accessing and analysing transactional data. Transactional data generated by banks and MNOs is proprietary, and concerns about competitive advantage and data privacy may make data owners reluctant to share the data or insights derived from customer-level analysis. Where data is generated by switches and other third-party transaction facilitators it is often only possible to link this to an account, but not a specific customer.

In addition, transactional data on its own provides an incomplete view of the consumer and transaction profiles. Demographic data collected and maintained by banks and MNOs is often sparse, covering basic variables such as age, geographic location and sometimes gender, and can be poorly maintained. In addition, there is no visibility on cash transactions. Nor can transactional data provide insight into customer perceptions, attitudes and motivations.

In an ideal scenario, we would want to analyse a combination of transactional data which provides an accurate and detailed record of **what** formal transactions a specific customer has done, matched with demand-side survey or diary data that provides critical context, fills in gaps with respect to cash transactions and explores perceptions, attitudes and motivations explaining **why** the customer behaves the way he or she does. This would provide a very rich picture of both the consumer context and his or her cash and electronic transactional activity. In addition, the methodology could enable a comparison between reported activity captured by demand-side instruments and actual activity as recorded by transactional systems, testing the reliability of reported transactional activity provided by survey respondents.

This project provided an opportunity to test the feasibility of this methodology, albeit imperfectly. The project team analysed transactional data generated by NIBSS and

conducted a survey of 3,000 respondents, 611 of whom were matched in the transactional data. Typically, transactional data generated within a switch cannot be matched back to a specific customer. However, in Nigeria, all transactions processed by NIBSS are associated with the unique banking identifier known as the BVN. This number is assigned to customers on registration and is a requirement for opening a bank account. Because of the presence of the BVN in the NIBSS data, it is possible to aggregate and analyse the data at a customer level.

The objectives of the study were to explore NIBSS data in combination with demand-side data and, where possible, create indicators of financial inclusion in Nigeria. More broadly, the project aimed to assess the potential value of transactional data maintained by NIBSS in supporting efforts to monitor progress on financial inclusion targets in Nigeria. In addition, the project aimed to test the feasibility of conducting matched transactional and demand-side research more broadly and understand how it could be optimised in the future.

3. Data

As noted, this study makes use of both transactional level data and demand-side survey data.

Transactional data used in this study

The transactional data used in this analysis was provided by NIBSS. NIBSS is the Nigeria Central Switch, enabling interoperability between the various financial services providers including banks, mobile payment operators, non-bank financial institutions, payment terminal providers and card acquirers. It is owned by all licensed banks including the CBN⁴. All interbank and POS transactions in Nigeria are processed by NIBSS. Because each transaction is accompanied by a unique BVN, it is possible to aggregate transactional data at a customer level.

To facilitate an analysis of their data, NIBSS drew a random sample of one million BVNs (i.e. unique customers). Transactional data for this sample included a complete record of all transactions for each BVN starting as far back as 2014 for some platforms and ending in December 2017. The transactional data provided by NIBSS includes date and time of the transaction, value, channel (where applicable) as well as data on returned or failed transactions.

All BVNs in the data sample were masked. Because of the confidentiality of the data and concerns about data security, the team analysed the data on-site in Lagos.

Box 1: NIBSS payment platforms

NIBSS holds data on numerous payment platforms:

NIP: This is an innovative e-payment solution designed by NIBSS to service the banking industry. The service is offered via several channels including banks' internet banking, mobile and bank branch. The service was launched in 2011 and since then the number of transactions has been growing rapidly; in the two years between January 2017 and December 2018, the number of monthly transactions increased from around 20 million to more than 80 million⁵. A total of 415,000 unique customers in the data sample have used NIP.

POS transactions: All POS transaction in Nigeria are processed by NIBSS. The number of POS transactions in Nigeria has also been increasing rapidly, increasing from less than 8 million transactions in January 2017 to more than 30 million transactions in December 2018⁶. A total of 30,000 unique customers in the data sample have conducted a POS transaction.

Cheque transactions: Unlike with NIP and POS, cheque transactions have been decreasing from around 885,000 transactions in January 2017 down to just over 700,000 transactions in December 2018⁷.

NEFTs: These are batch transfers (i.e. they are not instant). In the data sample a total of 9,400 unique customers have conducted a NEFT payment.

CMMS⁸ transactions: These are direct debits. In the data sample, just 900 unique customers have conducted a direct debit.

4 <https://nibss-plc.com.ng/company-overview/>

5 <https://nibss-plc.com.ng/nip/>

6 <https://nibss-plc.com.ng/pos2/>

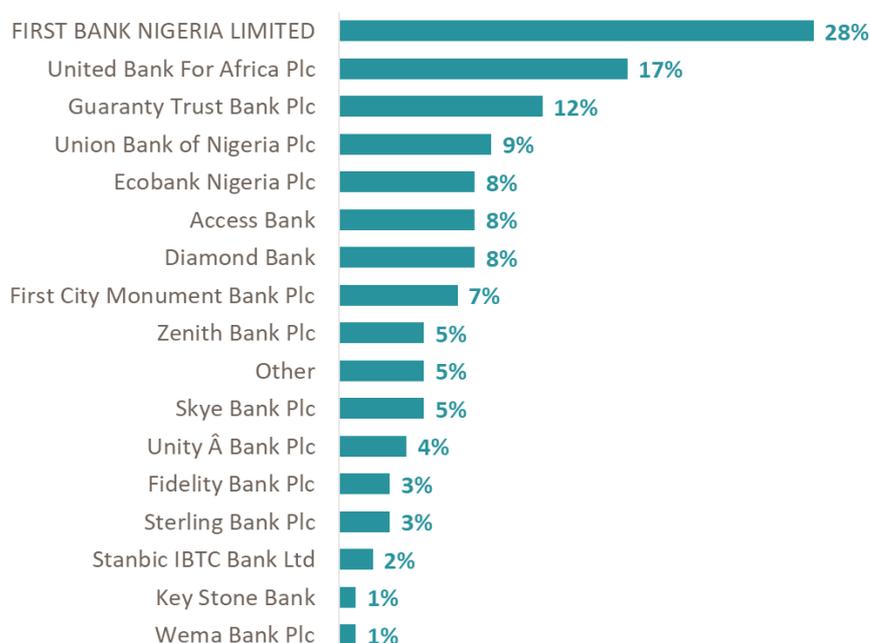
7 <https://nibss-plc.com.ng/cheques/>

8 Central Mandate Management System. This system enables NIBSS's Automated Direct Debits

mCASH: NIBSS created the mCASH solution for merchants to receive instant payments via mobile phone. The solution leverages the NIP platform by giving merchants unique codes that customers can use to make instant payments. It was first launched in 2016. Given that the data sample only provides transactional data up to December 2017, there are just 528 unique mCASH customers.

While the data is rich, there are a number of limitations. Because NIBSS is a switch, there is no visibility on intrabank, or on-us transactions. These transactions occur within the same bank (both the payor and the beneficiary use the same bank) and are not processed through a switch. These are likely to account for the majority of transactions; as per data from the 2017 Financial Inclusion Insights survey summarised in Figure 9, the largest three banks in Nigeria account for roughly 60% of the banked population.

Figure 9: Bank customer market share (For adults with a bank account, at which banks do you personally have a registered account?)



Source: Financial Inclusion Insights Survey, 2017

In addition, NIBSS does not process ATM transactions; cash withdrawals are therefore also not included in the data set. This makes it impossible to assess the relative value of digital transactions to cash withdrawals over a period of time, a useful indicator of digitisation.

A final inherent feature of the transactional data given that it originates from a switch and not a bank or MNO is that it does not include account balances. Consumers who use their bank accounts to maintain or grow balances only will therefore not appear in the data.

With regard to customer profiles, basic demographics are available for each BVN. These are provided by the customer on registration and include age, gender, a cell phone number and the customer's location. There are no processes to update contact and location data and it is expected that the quality of this data will degenerate over time. Given this fairly

limited customer data, it is not possible to identify customers who would be categorised as poor in order to assess the low-income groups' engagement with digital financial services.

Demand-side data

Data from the 2018 EFlnA A2F survey was used to provide a broad country overview. In addition, to gain a better understanding of customer payment needs a demand-side survey was administered both to a sample of customers selected at random from the NIBSS data sample in two states; Lagos and Kano. Lagos was selected as a sampling area because of the concentration of NIBSS customers that reside in the state. Kano in the north of Nigeria, is less urbanised and has lower income levels compared to Lagos. NIBSS provided contact details for a sample of customers registered in these states. These customers were contacted by Nielsen Nigeria, the research house that conducted the fieldwork. Of the initial list of 4,710, a total of 611 respondents were recruited for the research, the majority of whom were from Kano (448 were from Kano and 163 from Lagos). Data was collected in November and December 2018. Low response rates were expected in light of the poor quality of contact data and sensitivity of the research topic.

In addition to this linked survey, the same questionnaire was administered to a larger non-linked sample of adults in the same areas in Lagos and Kano using random sampling. The non-linked sample has not been weighted, but it has been used to provide context on the payment needs of adults living in urban centres in Lagos and Kano. A total of 1,339 respondents in Lagos and 1,058 respondents in Kano were surveyed.

The survey questionnaire explores access to financial services, uptake of services, specific payment use case, channel use and drivers of usage. It also provides a rich source of demographic data that is not visible in transactional data. For example, NIBSS only has information on age, gender and location at the time of BVN registration while the survey instrument gathers data on source and level of income, living standards, levels of education and life stage. In addition, the survey data provides information on activity that is invisible in transactional data including cash usage.

4. Country context

Nigeria has a population of more than 180 million people making it the most populous country in Africa. It also has the largest economy on the continent. It is Africa's biggest oil exporter and has the largest natural gas reserves on the continent. In the decade between 2006 and 2016 Nigeria's gross domestic product (GDP) grew at an average of 5.7% per year, although growth is volatile and highly dependent on oil prices⁹.

The majority of adults in Nigeria generate income from being self-employed. According to the EFINA Access to Finance 2018 survey, 40% of adults say that their main source of income is from their own business. Agriculture is also extensive, dominated by small-scale and subsistence farming; 17% of adults say this is their main source of income with only 6% of adults citing commercial or large-scale farming. Just 13% of adults earn a salary or wage; 5% from the informal sector and 8% from the formal sector.

Digitising payments is a cornerstone of Nigeria's financial inclusion strategy, an objective that is hampered by low banking penetration and very low take-up of mobile money to date. According to the latest EFINA Access to Finance 2018 survey results, 37.5 million adults (38%) in Nigeria have a bank account (either in their own name or access to someone else's account). Mobile money usage is limited; just one million adults have used or are registered for mobile money.

In an effort to increase the security of accounts and payments and reduce fraud, the CBN introduced a biometric identification system which requires everyone with a bank account to have a BVN. In addition, according to a 2017 CBN circular¹⁰ KYC tiers 2 and 3 mobile-money wallet holders also need a BVN. The BVN assigns a unique identity to each customer that can be verified across the Nigerian Banking Industry¹¹. As at January 2019, more than 36.5 million BVNs had been issued. From an analytical perspective, the BVN enables transactional and banking data to be linked back to a specific customer.

While access to a bank account remains relatively low, the payments landscape in Nigeria is innovative. In 2011, NIBSS launched NIP. The service enables immediate transfer to value and can be offered via multiple channels including internet, mobile, ATM and bank branches. While pricing varies by bank, transaction fees are capped at N50¹² by the CBN. According to NIBSS, Nigeria is the only country in Africa to have deployed such a solution¹³.

9 <https://www.worldbank.org/en/country/nigeria/overview>

10 See <https://www.cbn.gov.ng/Out/2017/BPSD/Review%20of%20Daily%20MM%20Wallet%20Transaction%20&%20BVN%20Requirement%20for%20Mobile%20Money%20Wallet%20Holders.pdf>. KYC tier 1 mobile-money wallets have a daily cumulative transaction limit of N50,000 and a balance limit of N300,000.

11 <https://nibss-plc.com.ng/bvn/>

12 N50 is equivalent to USD0.16 using the average interbank exchange rate of USD1: N306.77 (February 2019). See Guide to Charges by Banks and Other Financial Institutions in Nigeria published by the CBN in 2017 (effective May 2017) available at <https://www.cbn.gov.ng/out/2017/fprd/guide%20to%20bank%20charges%20circular%20to%20all%20banks%20other%20financial%20institutions%20and%20mobile%20payments%20operators.pdf>

13 <https://nibss-plc.com.ng/services/ncs/>

More recently, NIBSS launched mCASH to facilitate low-value retail payments. This service is aimed at merchants and leverages the NIP infrastructure to enable merchants to receive payment instantly. The merchant is required to have a unique “seller code”. Customers can then make instant payments via USSD functionality on their mobile phone using this seller code¹⁴. Unlike standard NIP transactions where fees are borne by the customer initiating the transaction, fees for mCASH transaction are shared between the merchant and the customer.

14 <https://nibss-plc.com.ng/services/mcash/>

5. Key findings: Non-linked demand-side survey

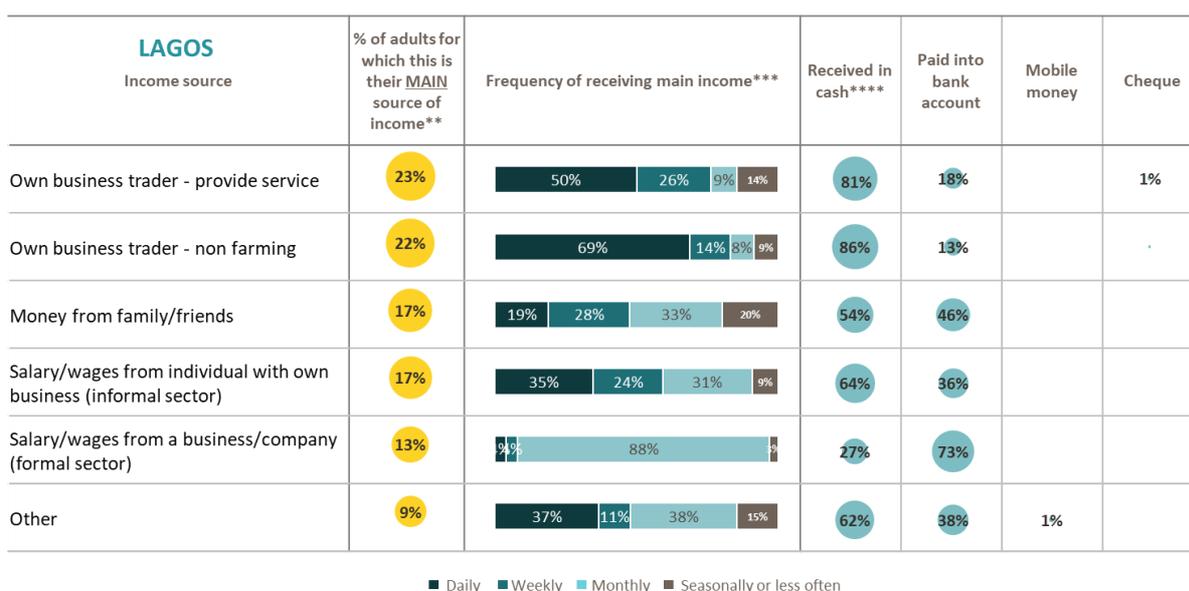
The surveys were conducted in urban areas in Lagos and Kano. Survey respondents are more likely to be banked than the general population in urban areas; 91% of respondents in Lagos and 53% of respondents in Kano have a bank account in their own name. According to EFINA 2018, 69% of urban adults in Lagos and just 14% of urban adults in Kano have a bank account in their own name. The survey is also biased toward younger respondents; around 70% of survey respondents are under 35 years old.

The survey questionnaire focuses specifically on payments, both receiving and making payments.

Receiving payments

Over half of respondents in Lagos and just under 60% of respondents in Kano are business owners. Salary and wage earners make up just 18% of respondents in Lagos and 13% in Kano. Business owners tend to earn their income frequently – either daily or weekly – and the vast majority of business owners receive this income in cash. Respondents that earn a salary from the formal sector tend to receive this income on a monthly basis and are often paid directly into a bank account (73% in Lagos and 48% in Kano) as indicated in Figure 10. In total, just over one third of respondents in Lagos and 17% of respondents in Kano receive their main income source into an account. Men are twice as likely to receive their main source of income into an account. In Lagos, 44% of men and 23% of women receive their main source of income into an account. For Kano, the proportions are 23% of men and just 10% of women.

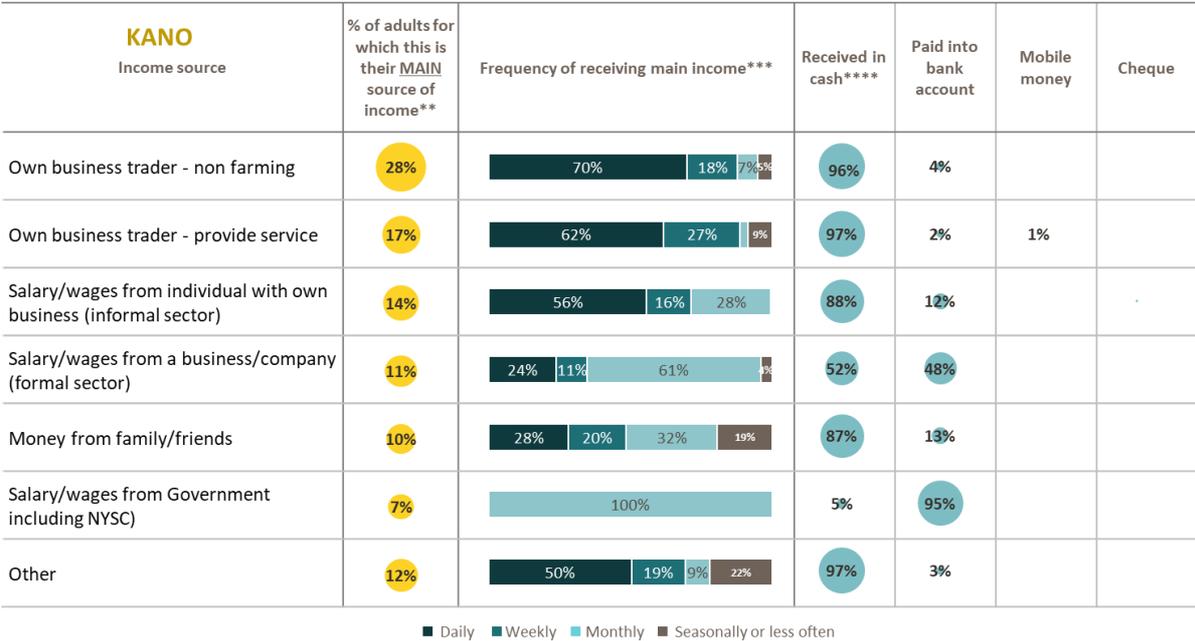
Figure 10: Lagos – Main income source, frequency of receipt and method of receipt



Source: Non-linked DSS, Lagos (1,339 respondents)

Note: Only income sources with more than 40 respondents are included

Figure 11: Kano – Main income source, frequency of receipt and method of receipt



Source: Non-linked DSS, Kano (1,058 respondents)

Note: Only income sources with more than 40 respondents are included

Of those who do not receive income directly into an account, more than one quarter of respondents in Lagos and 14% of respondents in Kano subsequently deposit some or all of this into an account.

Conversely, of those who receive their main source of income directly into an account, 12% of respondents in Lagos and 20% of respondents in Kano prefer cash and so withdraw all the funds as soon as they are deposited, treating their account as a “post box”.

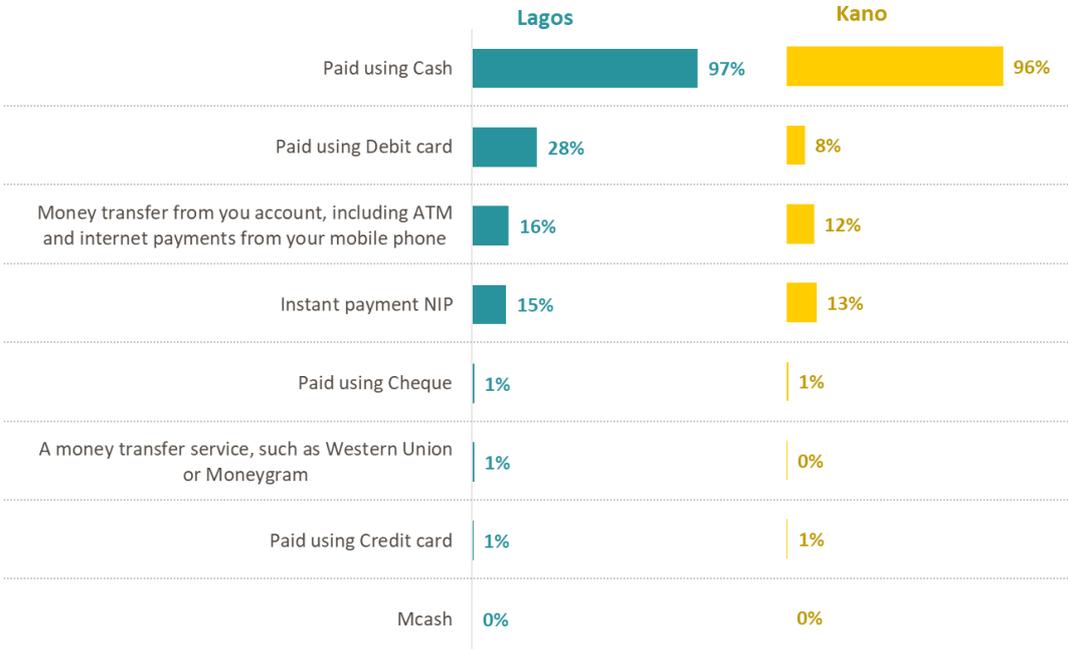
Remittances are often the first payment use case to digitise. According to this survey, in the past six months, 57% of respondents in Lagos and 30% of respondents in Kano received a remittance into an account.

Considering both the main source of income and remittances received in the past six months, 65% of respondents in Lagos and 37% in Kano received income into an account.

Making payments

The survey explored the various devices used to make payment in the past 90 days. The results shown in Figure 12 highlight the relatively low take-up of digital payment devices or services. While there may be various factors that might make cash preferable, if merchants do not accept digital alternatives to cash, consumers clearly have no choice. According to the survey, half of respondents in Lagos and just under two thirds of respondents in Kano (64%) said that businesses in their community do not accept non-cash payments.

Figure 12: “Have you used any, or done any, of the following in the last 90 days?”

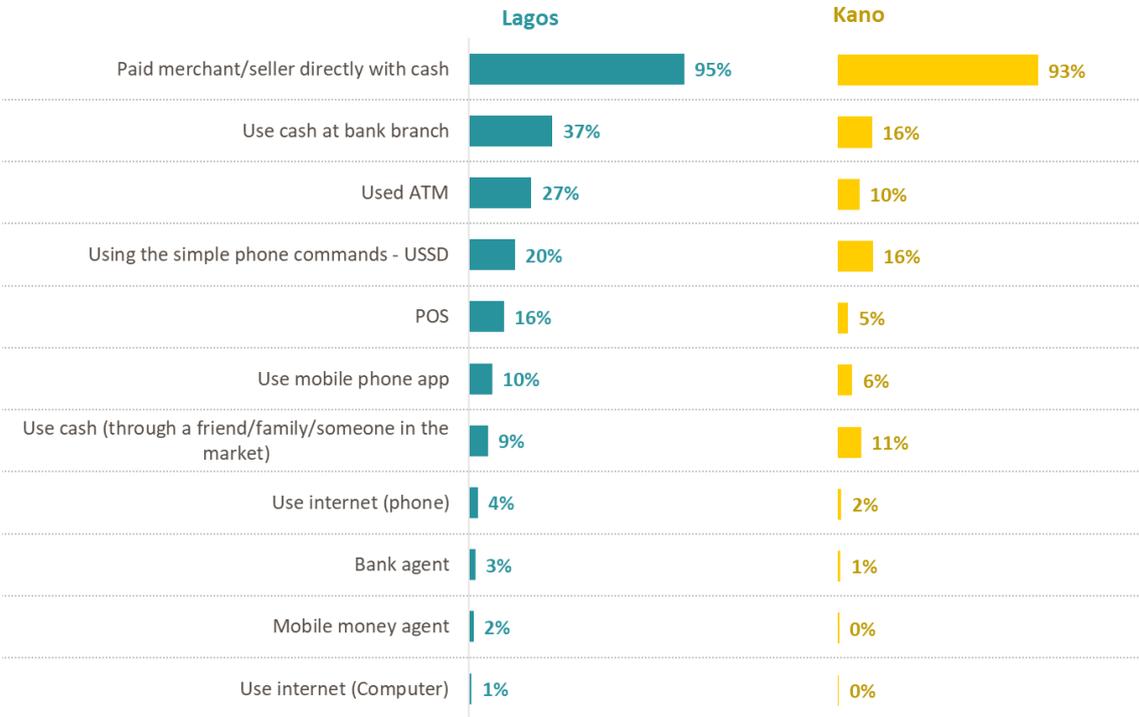


Source: Non-linked DSS

Payments using debit cards are relatively common while 15% of respondents in Lagos and 13% of respondents in Kano have done a NIP payment in the past 90 days. However, this is likely understated; a large portion of respondents who have transferred money say they used USSD to make the transfer. While many of these payments may be on-us, some of these may be NIP payments.

Respondents were asked about the various channels they have used over the past 90 days to make payments. Given the dominance of cash, it is not surprising that digital channels are used by a relatively low proportion of adults.

Figure 13: Channels used to make a payment in the past 90 days



Source: Non-linked DSS

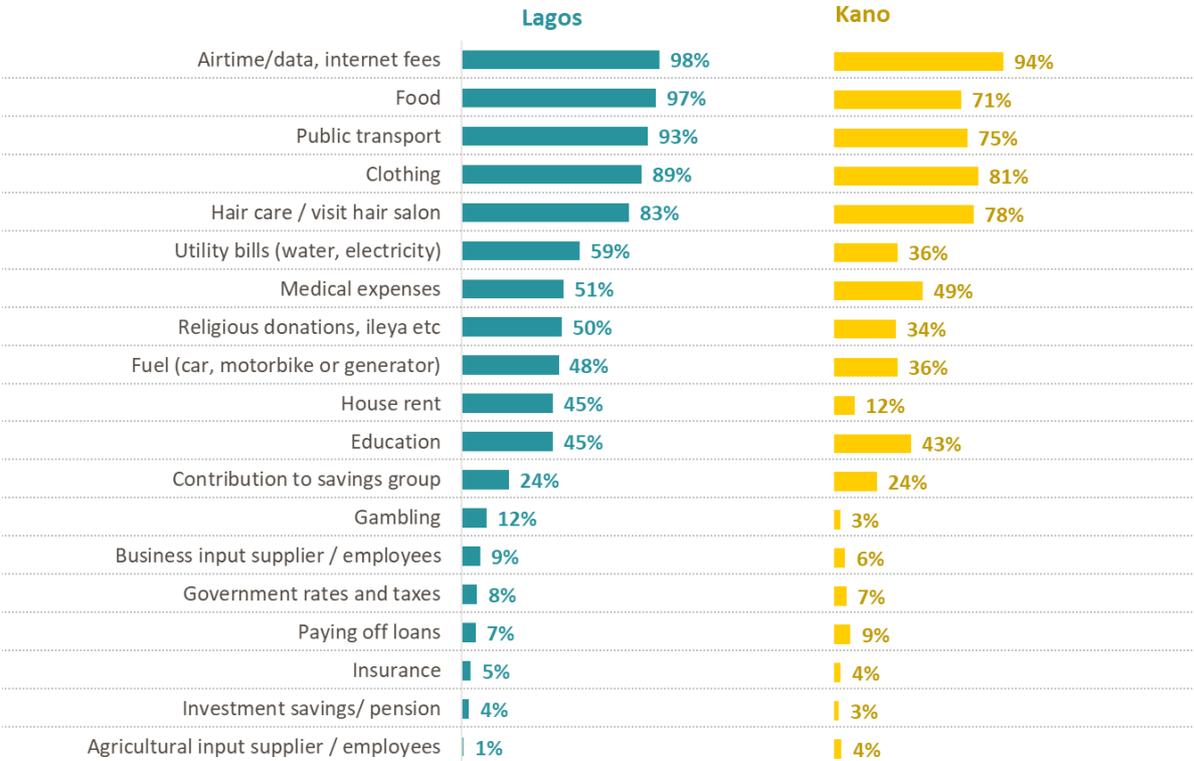
Taking all digital channels into account¹⁵, 41% of respondents in Lagos and 24% of respondents in Kano made at least one fully digital payment – where both the store of value and the channel is digital – in the *past 90 days*¹⁶. Men are more likely than women to have made a fully digital payment. In Lagos, just under half of male respondents made a fully digital payment in the past 90 days compared to a third of female respondents. In Kano, 33% of male respondents had made a fully digital payment compared to just 14% of female respondents.

Turning the focus towards a *needs* lens, common payment use cases include airtime, food and transport. Tax payments are relatively low in both areas with just 8% of respondents in Lagos and 7% of respondents in Kano having paid government rates or taxes in the past 12 months. However, payments for utilities such as water and electricity are noticeable; 59% of respondents in Lagos and 36% of respondents in Kano have made a utilities payment in the past 12 months.

15 Digital channels include ATM, USSD, POS, mobile phone app and internet

16 For more detail on fully digital payments see Digital Financial Services Measurement Framework, insight2impact, April 2019

Figure 14: “In the last 12 months have you paid for the following?”



Source: Non-linked DSS

Remittances within Nigeria are relatively common; in the past six months 67% of respondents in Lagos and 44% of respondents in Kano sent money to someone over distance but still within Nigeria.

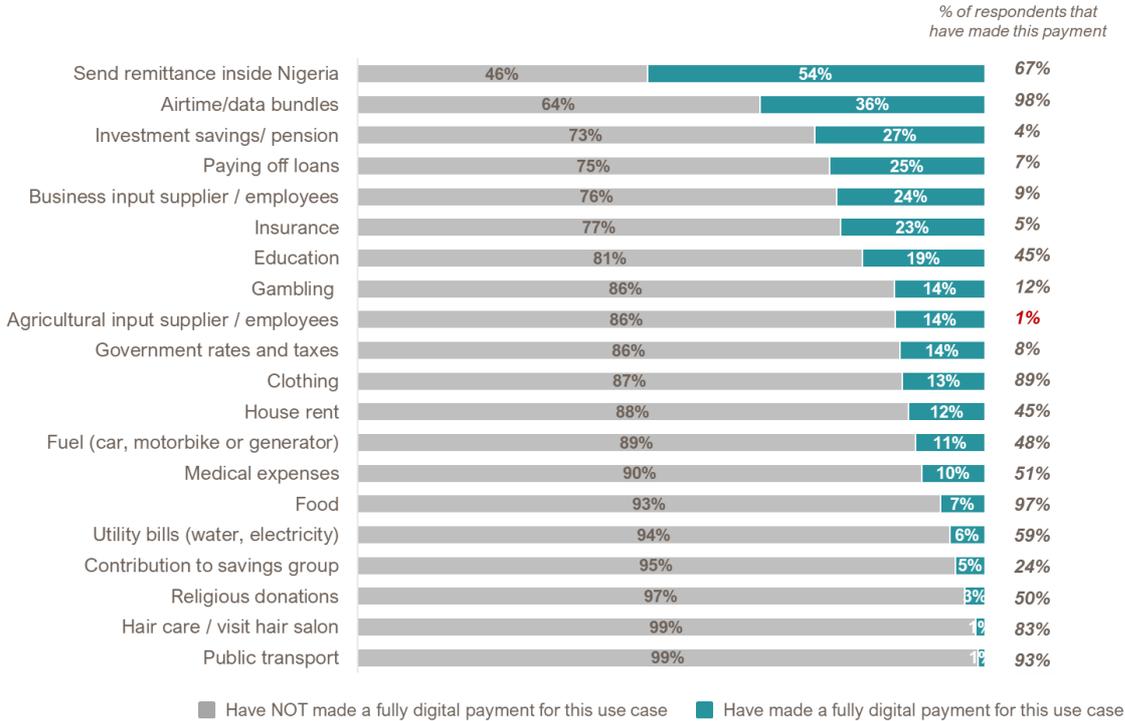
Figure 15 and Figure 16 show the proportion of respondents who make payments using a digital channel with remittances and airtime purchases most likely to have been made digitally. That said, there is much scope for growth; in Lagos roughly half of those who send a domestic remittance do so digitally and 36% of those that purchase airtime do so digitally. In Kano, the proportions are 49% and 23% respectively.

Many of the payment use cases where usage of digital channels is relatively high tend to be niche payments. For example, in Lagos, after domestic remittances and airtime, the payment use-cases most likely to be fully digital include payments towards investment savings or pensions, paying off loans, business inputs or employee payments, and insurance. These payment use-cases however apply to less than 10% of respondents.

Payments that could be potential drivers for digitisation include person-to-government payments (P2G) such as payments for utilities and taxes. These payments currently show a very low level of digitisation with just 6% of respondents paying for utilities and 14% of respondents paying taxes doing so via a digital channel in Lagos. In Kano, the proportions are 3% and 14% of respondents, respectively.

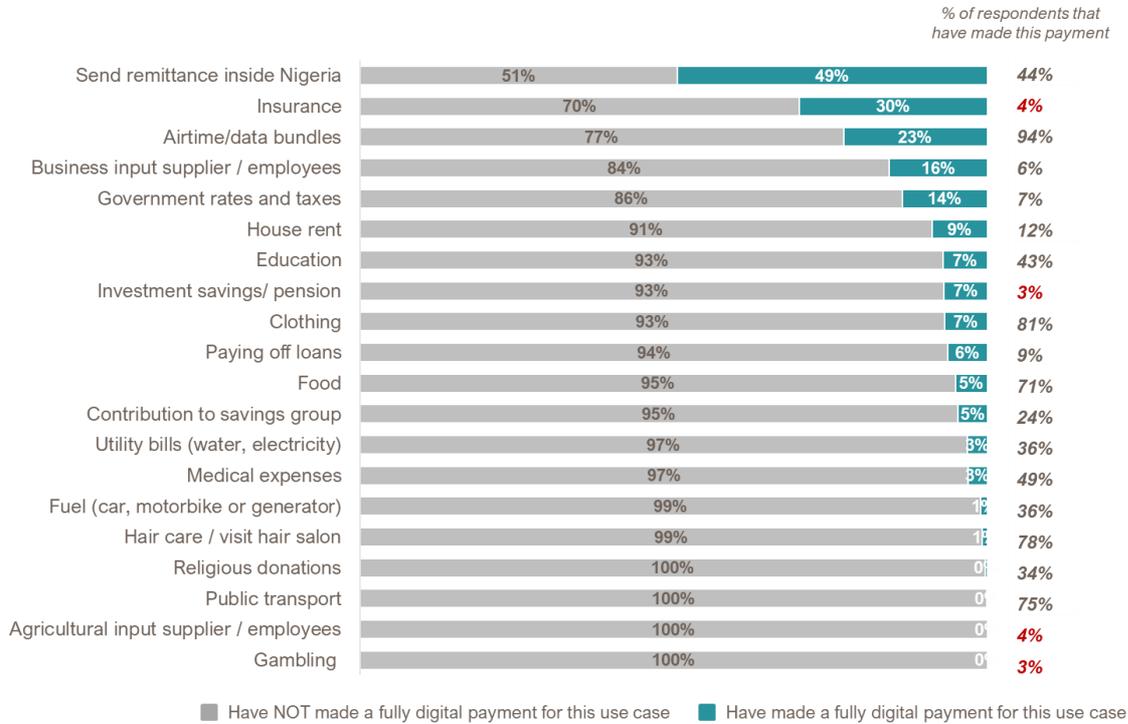
Other payments that could provide opportunities for digitisation include payments for education and medical expenses. These are relatively common payments that are currently being made largely in cash. Digitising other common use cases such as food, transport, clothing and hair care is likely to be more challenging given that there is no obvious aggregator or mechanism to incentivise or compel business owners to digitise. On the contrary, for business owners who can avoid paying tax because their activities are unrecorded, digitising payments may come with distinct disadvantages.

Figure 15: Lagos – Proportion of respondents that have made a fully digital payment by payment use case in the past 12 months



Source: Non-linked DSS (Lagos). Note: Small sample sizes of fewer than 50 highlighted in red

Figure 16: Kano – Proportion of respondents that have made a fully digital payment by payment use case in the past 12 months



Source: Non-linked DSS (Kano). Note: Small sample sizes of fewer than 50 highlighted in red

Figures Figure 17 and Figure 18 consider the specific digital channels used for each payment use-case. The blue bubbles in the figures indicate the proportion of respondents that have made the payment in the past 12 months and the yellow bubbles indicate the proportion of respondents that have made the payment using a specific channel. For example, 98% of respondents in Lagos have made a payment for airtime in the past 12 months, and 28% of these respondents made this payment using USSD functionality on their phone.

Figures Figure 17 and Figure 18 indicate that payments via mobile phones are driving digital payments, with the majority of these payments using USSD. Payments made via an ATM or through a card swipe at a POS are less common. Although POS payments are more likely when paying for everyday purchases such as food, clothes and fuel.

Figure 17: Lagos – payment use cases and channel used to make payment

LAGOS	% of adults that made this payment	Channel used to make payment							
		Cash directly to merchant/other non-digital channel	ATM	POS	Vendor merchant portal	Computer - Use internet banking	Phone - Using USSD	Phone - Use mobile phone app	Phone - Use internet banking
Transfer of value needs									
Airtime/data bundles	98%	97%	8%	1%			28%	6%	2%
Food	97%	100%	1%	5%			1%	1%	
Public transport	93%	100%							
Clothing	89%	99%	3%	6%			5%	2%	1%
Hair care / visit hair salon	83%	100%	1%						
Send remittance inside Nigeria*	67%	69%	15%	4%			35%	11%	3%
Utility bills (water, electricity)	59%	99%	2%	2%			1%	1%	1%
Medical expenses	51%	99%	3%	4%			4%	1%	
Religious donations	50%	100%	1%	1%	1%		2%	1%	
Fuel	48%	100%	1%	10%			1%		
House rent	45%	94%	2%			1%	7%	3%	1%
Education	45%	90%	6%	1%	1%	2%	6%	5%	3%
Contribution to savings group	24%	98%	1%				3%	1%	
Gambling	12%	99%	2%	1%	1%	1%	5%	5%	2%
Business supplier / employees	9%	97%	7%	2%	1%	2%	11%	9%	2%
Government rates and taxes	8%	89%	5%	2%	1%	2%	2%	3%	1%
Paying off loans	7%	87%	6%	1%	1%	3%	14%	9%	3%
Insurance	5%	72%	8%	3%			5%	8%	3%
Investment savings/ pension	4%	79%	6%	2%	2%	2%	15%	4%	2%
Agricultural supplier / employees	1%	Small sample size							

Source: Non-linked DSS (Lagos).

*Note: Based on payments made in past 12 months, for remittances, based on domestic remittances sent in past six months

Figure 18: Kano – payment use cases and channel used to make payment

KANO	% of adults that make this payment	Channel used to make payment							
		Cash directly to merchant/other non-digital channel	ATM	POS	Vendor merchant portal	Computer - Use internet banking	Phone - Using USSD	Phone - Use mobile phone app	Phone - Use internet banking
Transfer of value needs									
Airtime/data bundles	94%	96%	3%				20%	3%	
Clothing	81%	100%		2%			5%	2%	
Hair care / visit hair salon	78%	100%							
Public transport	75%	100%							
Food	71%	99%	1%	3%			2%	1%	
Medical expenses	49%	98%			1%		1%	1%	
Send remittance inside Nigeria*	44%	65%	10%	1%			35%	8%	2%
Education	43%	95%	1%			1%	4%	2%	1%
Utility bills (water, electricity)	36%	99%		1%			1%		
Fuel	36%	100%	1%				1%		
Religious donations	34%	100%							
Contribution to savings group	24%	98%					4%	2%	
House rent	12%	100%					7%	2%	
Paying off loans	9%	98%	1%				5%	3%	
Government rates & taxes	7%	88%	1%		7%	4%			
Business supplier / employees	6%	97%	2%				8%	13%	
Agricultural supplier / employees	4%	98%							
Insurance	4%	58%			18%	5%	3%	5%	
Gambling	3%	Small sample sizes							
Investment savings/ pension	3%								

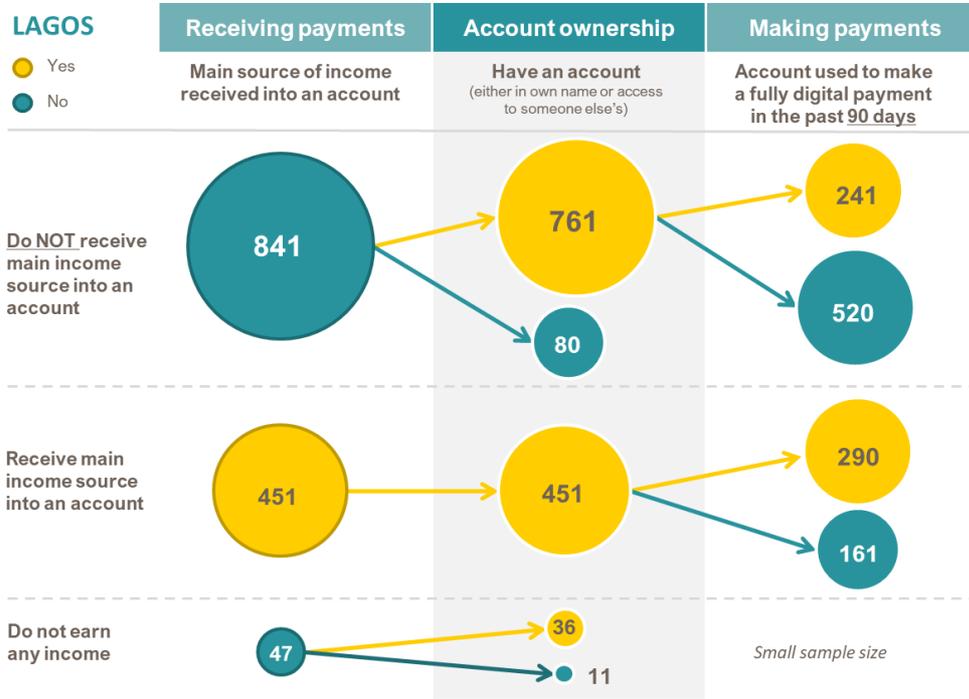
Source: Non-linked DSS (Kano).

*Note: Based on payments made in past 12 months, for remittances, based on domestic remittances sent in past six months

Usage journey

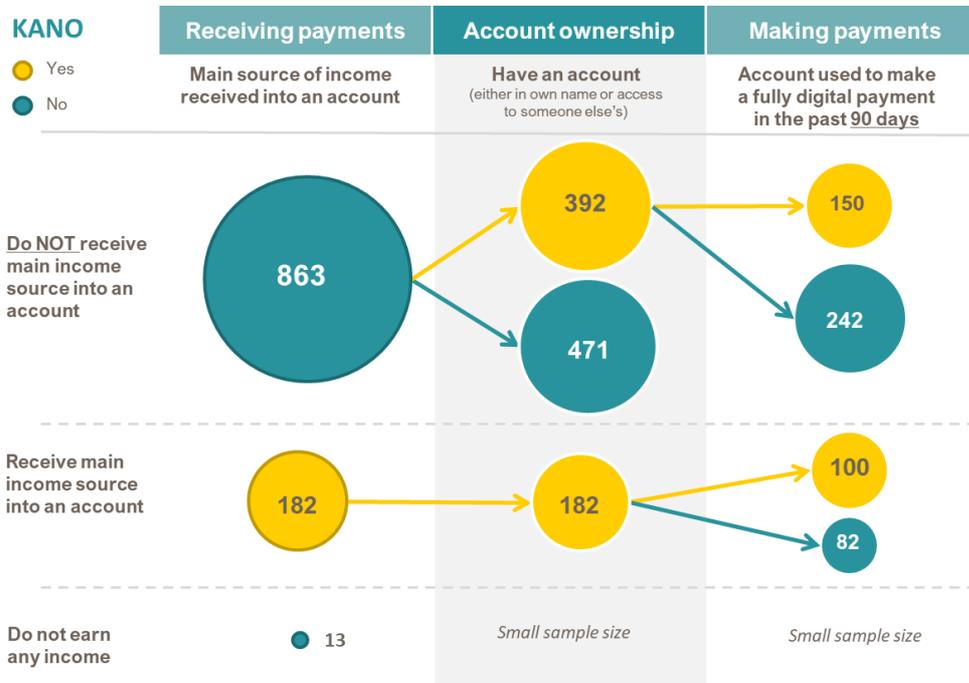
Unsurprisingly, respondents that receive their income into an account are more likely to make fully digital payments where both the store of value and the channel are digital. In Lagos, of those respondents that receive their income into an account 64% have made a fully digital payment in the past 90 days. For those that did not receive their income into an account just 29% have made at least one digital payment in the past 90 days. In Kano, 55% of respondents that received income into an account made a fully digital payment in the past 90 days versus just 17% of respondents that did not receive their income into an account. These journeys are illustrated in Figures Figure 19 and Figure 20.

Figure 19: Lagos – Income receipt and making digital payments



Source: Non-linked DSS (Lagos)

Figure 20: Kano – Income receipt and making digital payments



Source: Non-linked DSS (Kano)

6. Transactional data and linked survey

The demand-side survey data provides useful context on the different payment use cases and how these are currently being met. Survey data can often generate usage indicators such as frequency, recency and value of transactions. However, this data can be less reliable than more generalised questions around payments made and the channels used to make them because they require detailed recall. Transactional data provides an exact record of transactions including the date and time the transaction was made, as well as the value of the transaction, and so is highly reliable. In addition, transactional data can be used to analyse trends in payment patterns over time.

Box 2: Comparing transactional and survey data

The team initially set out to test the extent to which demand-side data accurately reflects usage information such as frequency and value of payments made through various channels. Respondents of the linked demand-side survey can be matched to customers included in the NIBSS data sample so that a direct comparison between reported and actual behaviour can be made. However, the team was unable to compare the two data sources because the NIBSS data sample included transactional data up to December 2017 and the demand-side survey was run a year later in December 2018. Any significant differences in reported versus actual behaviour could not be attributed to ineffective recall as opposed to behaviour change over the year. In addition, because the NIBSS data only includes a subset of transactions (only inter-bank transactions), direct comparisons are difficult.

As noted, a key limitation of the NIBSS data is that only inter-bank transactions are visible to NIBSS, with the exception of POS payments (all POS payments are visible to NIBSS). Intrabank or “on-us” payments are therefore not visible. To explore “on-us” transactions, respondents who had sent a domestic remittance within the past six months were asked if the recipient banks at the same bank. Around a quarter to a third of respondents (depending on area and channel used – USSD vs mobile-phone app), said that the respondent banked at the same bank (i.e. the transaction was “on-us”). These payments would therefore not be invisible to NIBSS.

In addition, some of the specific payment use-cases would not be visible to NIBSS. For example, the demand-side survey results indicate that airtime purchases are a significant driver of digital payments, but these are not visible in the NIBSS data as banks buy airtime in bulk and on-sell it¹⁷.

NIBSS platforms

As noted, NIBSS holds data on a number of platforms including NIP, POS, cheque, NEFT, CMMS¹⁸ and mCASH.

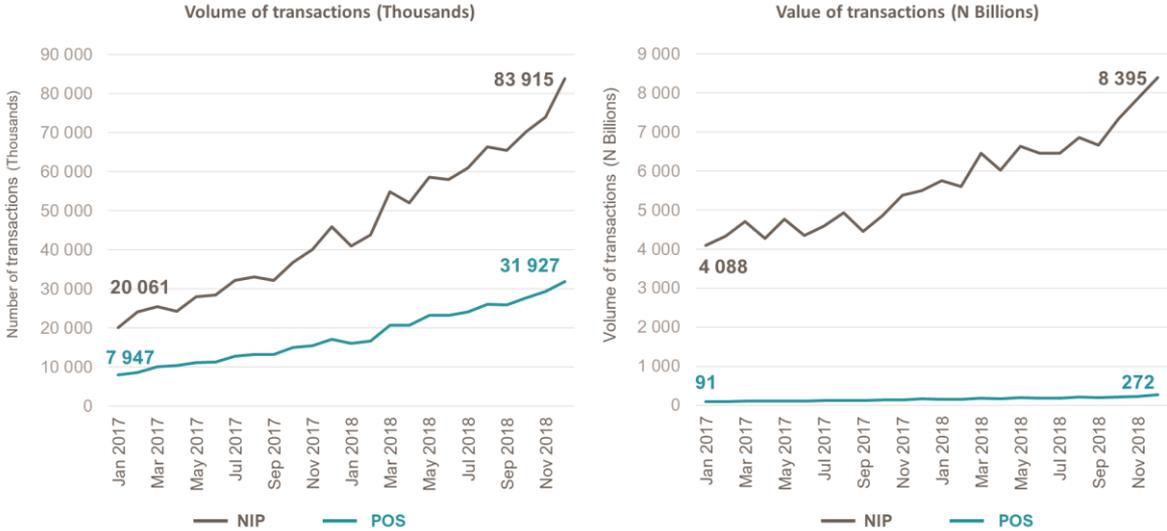
NIBSS publishes industry statistics including the volume and value of NIP and POS payments made, as shown in Figure 21. The data indicates that the volume of transactions on both platforms increased rapidly between January 2017 and December 2018 with just under 84 million NIP transactions in December 2018 and around 32 million POS

¹⁷ Source: Discussion with NIBSS, 4 July 2018

¹⁸ CMMS stands for Central Mandate Management System which supports NIBSS's Automated Direct Debits

transactions conducted in that month. By value, NIP dominates with a total value of N8.4 trillion transacted in December 2018 versus N27 billion through the POS platform.

Figure 21: Total volume and value of NIP and POS transactions (published by NIBSS)



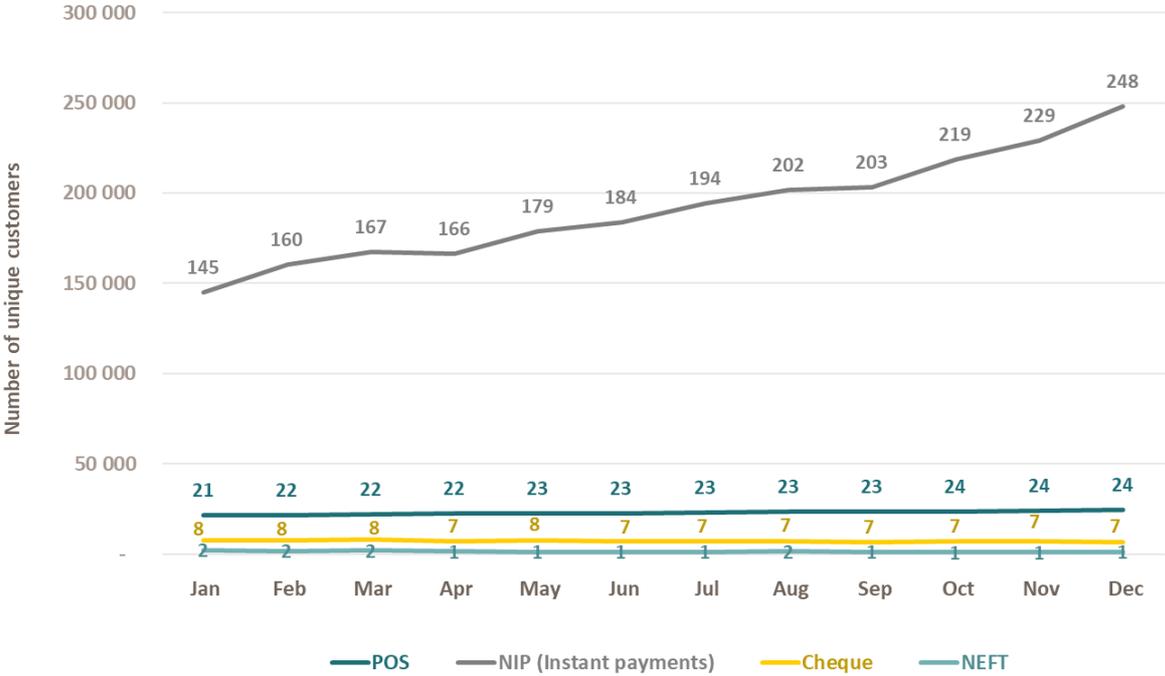
Source: NIBSS Industry Statistics, see: <https://nibss-plc.com.ng/report/>

However, NIBSS does not regularly publish any statistics based on the number of customers using these platforms¹⁹. The number of unique customers transacting on these platforms can be assessed using sample data provided by NIBSS by linking transactions to a BVN. Figure 22 shows the number of unique customers in the sample transacting each month per payment platform over 2017²⁰. It highlights the dominance of NIPs. In December 2017 just under 250,000 unique customers in the data sample made at least one payment using NIP. In contrast 24,000 made one or more POS payment, with 7,000 using cheques and just 1,000 making one or more NEFT payment. The number of unique customers using NIP to transact each month grew rapidly, almost doubling between January and December 2017 while there was no visible growth in the number of customers using other platforms.

¹⁹ NIBSS has recently published a blog that included customer numbers for NIP. See <https://nibss-plc.com.ng/nibss-instant-payments-nip-the-game-changer/>

²⁰ The figure below excludes the CMMS and mCASH platforms because they are very small with just 896 customers transacting over the CMMS platform, and 528 over mCASH in 2017.

Figure 22: Number of unique customers in data sample transacting per month in 2017 (data labels in

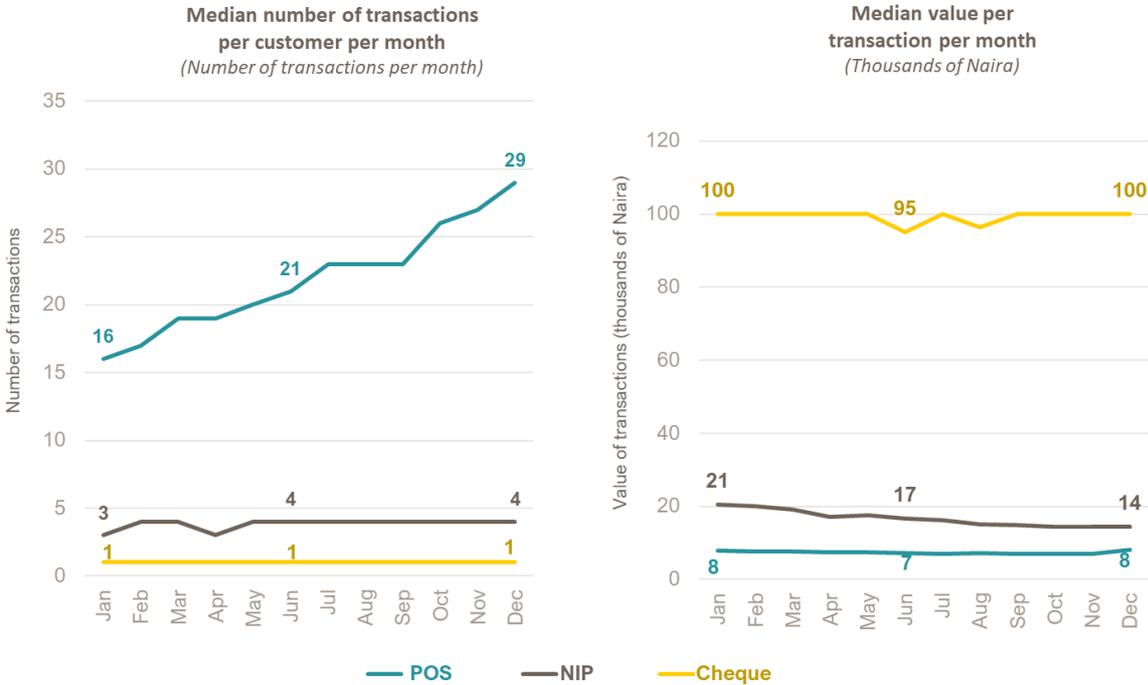


thousands)

Source: NIBSS data sample

The median number of transactions per customer per month and the median value per transaction are shown in Figure 23 for the top three platforms, namely NIP, POS and cheque. The top three platforms are associated with very different usage behaviours. Customers that used POS tend to conduct several low value transactions over that platform. In contrast, customers who transact by cheque use that platform infrequently, and for high value payments. Of customers that made a NIP payment in December 2017, they made four payments on average in the month with a median value of N14,000 (~ USD39) per transaction.

Figure 23: Median number of transactions per customer per month and median value per transaction



Source: NIBSS data sample

The median number of POS transactions conducted per customer per month increased rapidly over the course of 2017 although the average value per transaction remained constant. In contrast, the number of NIP transactions per customer per month remained fairly stable over 2017 however the average value declined significantly, consistent with a broadening base of customers and use cases. A comparison of NIP users that were first visible in the data prior to June 2017 and customers first visible in June 2017 or after indicates that the newer cohort of customers have a significantly lower median transaction values.

Focus on instant payments (NIP)

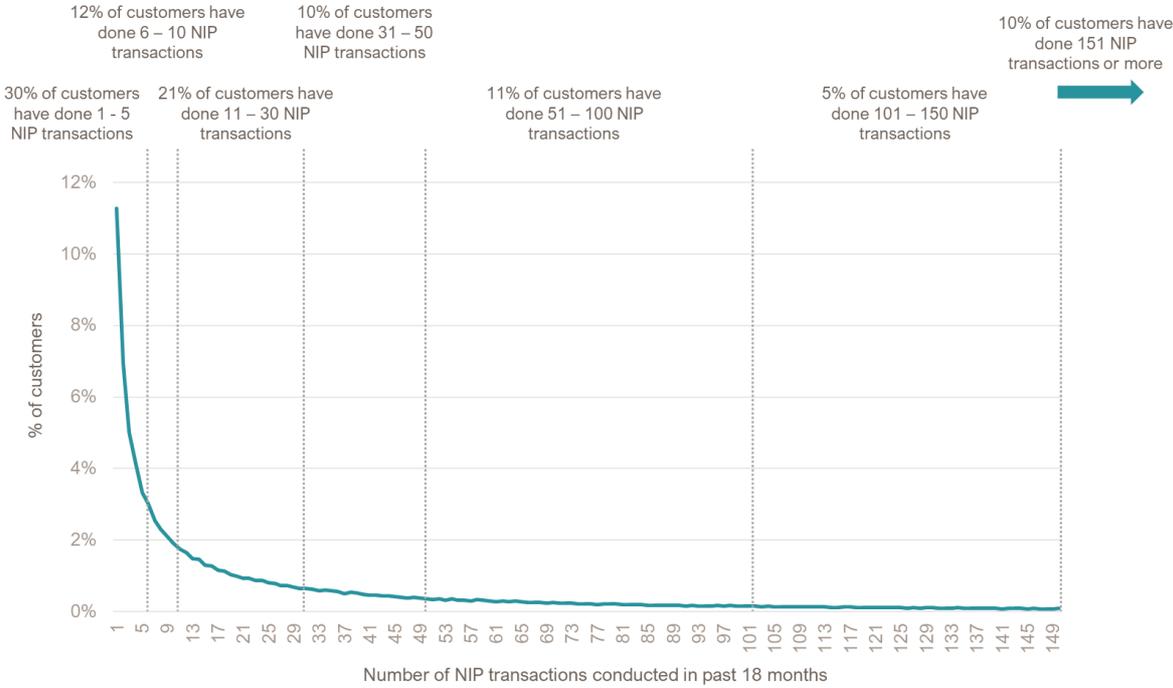
A total of 415,000 customers in the data sample have conducted a NIP transaction. NIP customers tend to be male (67%) and between the ages of 25 and 45 (63%). This demographic profile reflects the banked population in Nigeria, with a slight bias towards male users²¹. However, NIP customers are significantly more likely to live in Lagos – 32% are in Lagos compared to 13% of banked adults in Nigeria²².

The transactional history for NIP customers extends 18 months from July 2016 to December 2017. In terms of the number of NIP payments being done, 11% of NIP customer in the sample have only ever transacted once. On the other end of the spectrum, 10% of customers conducted more than 150 NIP transactions over the 18-month period.

21 Based EFINA 2018 data

22 Location data in NIBSS is based on the location where the customer signed up for the BVN. To assess the reliability of location, the survey asked respondents if they live in the same city/ town where they got their BVN. Just under 90% of respondents in Lagos and 94% of respondents in Kano said they do.

Figure 24: Total number of NIP transactions conducted over an 18-month period (chart cropped at 150 transactions)



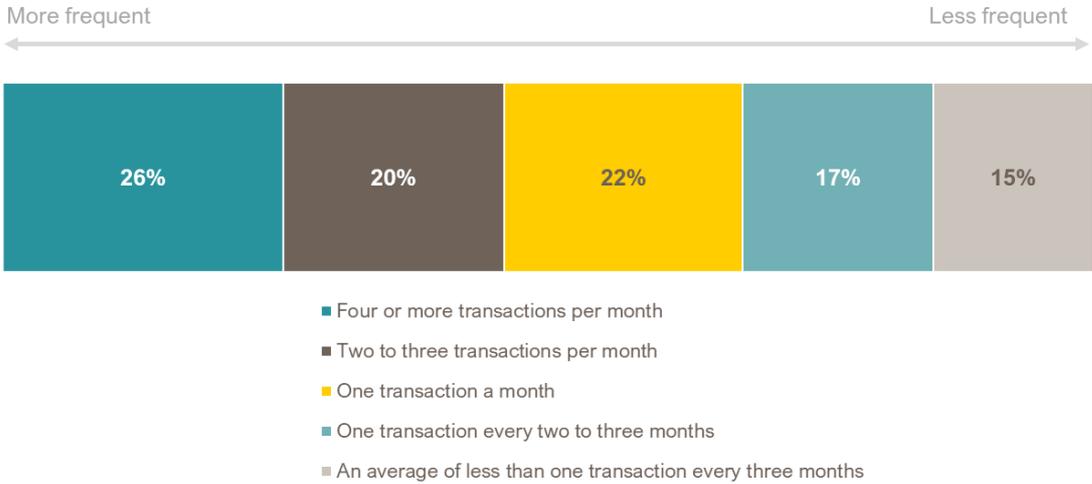
Source: NIBSS sample data

While Figure 24 gives the absolute number of NIP transactions conducted, it does not consider how long customers have been transacting on the platform. For example, some of the customers that have done very few NIP transactions may have only started transacting in November or December 2017 (i.e. they have only had one or two months in which to transact), whereas other customers may have started transacting in 2016.

The frequency of transactions takes this duration of transacting into account by considering the number of transactions made per month since the customer *was first visible* in the data sample.

Based on this methodology, half of NIP customers have done two or more NIP transactions per month on average since they were first visible in the data sample. On the other end of the spectrum, 15% of customers transact infrequently, conducting (on average) less than one NIP transaction every three months. As noted, NIBSS only has visibility of inter-bank transactions and so the frequency of instant transfers is understated.

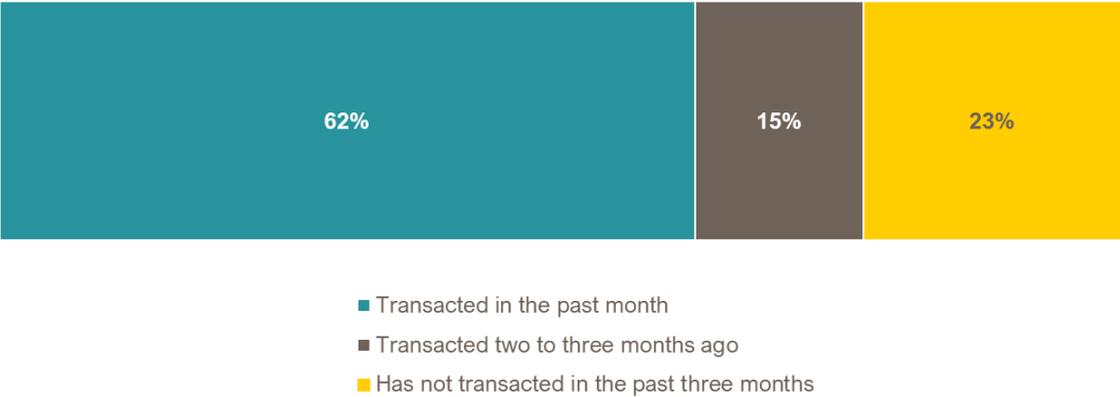
Figure 25: Frequency of transacting – number of NIP transactions conducted per month



Source: NIBSS data sample

In terms of recency, over 60% of NIP customers transacted in the past month (that is, they were visible in December 2017) and a further 15% transacted within the preceding two to three months. Just under one quarter (23%) had not conducted an inter-bank instant payment for three months or more.

Figure 26: Recency of conducting a NIP transaction



Source: NIBSS data sample

NIPs can be initiated via various channels including both digital and non-digital channels. Digital channels include mobile phone app, USSD²³, internet, via ATMs²⁴ and third-party

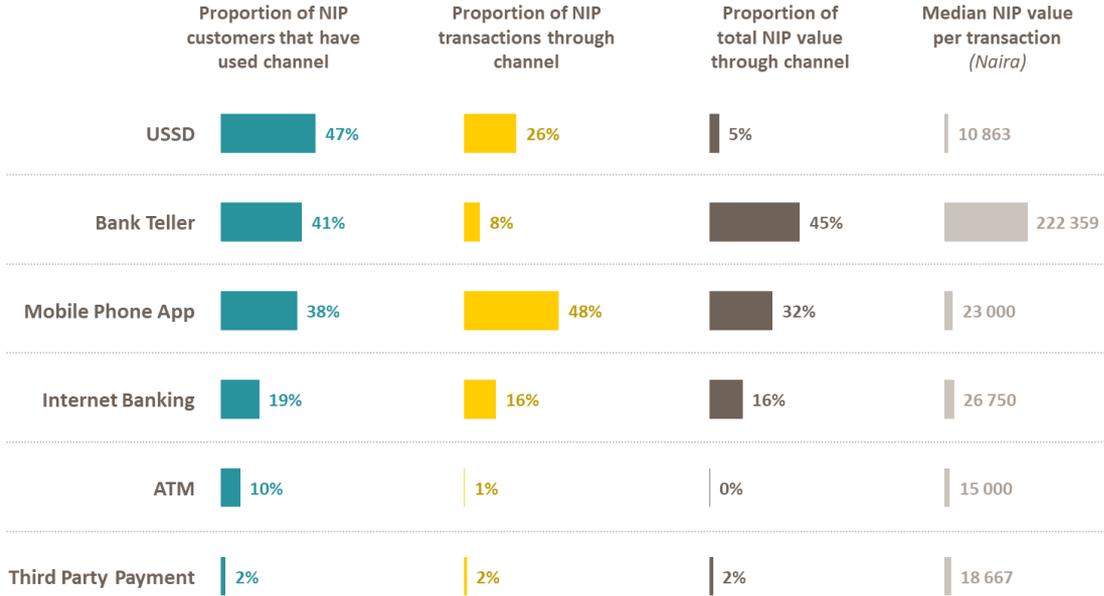
23 USSD or unstructured supplementary service data allows text messages to be sent over the GSM network using channels that are usually used for voice calls. It is similar to SMS but while SMS messages are stored on the mobile phone USSD runs as a real-time, open session. In addition, USSD is a menu-based service.

24 Note that NIBSS does not process ATM cash withdrawals but will see interbank credit transfers conducted over ATMs.

payment platforms typically accessed over the web. Non-digital channels include bank tellers (i.e. at the bank branch) and agents.

As per Figure 27, the most popular channel is USSD, a menu-driven, text-based mobile phone communication platform, used by 47% of NIP customers in the past 18 months, followed by bank teller (used by 41% of customers) and mobile phone app (used by 38% of customers). The number of transactions and value of transactions conducted through these channels differ significantly. By number of transactions, mobile phone apps dominate, contributing almost half (48%) of all NIP transactions conducted in the past 18 months. USSD contributed just over a quarter of transactions and bank tellers just 8% of transactions. Transactions via bank tellers, however, contributed 45% of the total value of NIP payments made in the past 18 months. Payments made via this channel are infrequent, but very large, with a median value of N222,400 (USD613). NIP transactions initiated over USSD have the lowest median values.

Figure 27: NIP channel usage over the past 18 months (July 2016 – December 2017)



Source: NIBSS data sample

Customers tend to use multiple channels to conduct NIP transactions, as per Figure 28 which shows the first visible channel used by NIP customers and subsequent channel usage. Many customers use both USSD and mobile phone app; this is likely due to familiarity with the different phone channels for different use cases (i.e. a customer may use USSD to pay a merchant but a banking app to transfer money to a family member).

Figure 28 indicates that for 27% of NIP customers the first channel used was a bank teller (i.e. a non-digital channel). Of these customers, 17% did not make a subsequent transaction, and 40% went on to use a digital channel to make NIP transactions.

Figure 28: First visible channel used to conduct a NIP transaction and subsequent channel usage

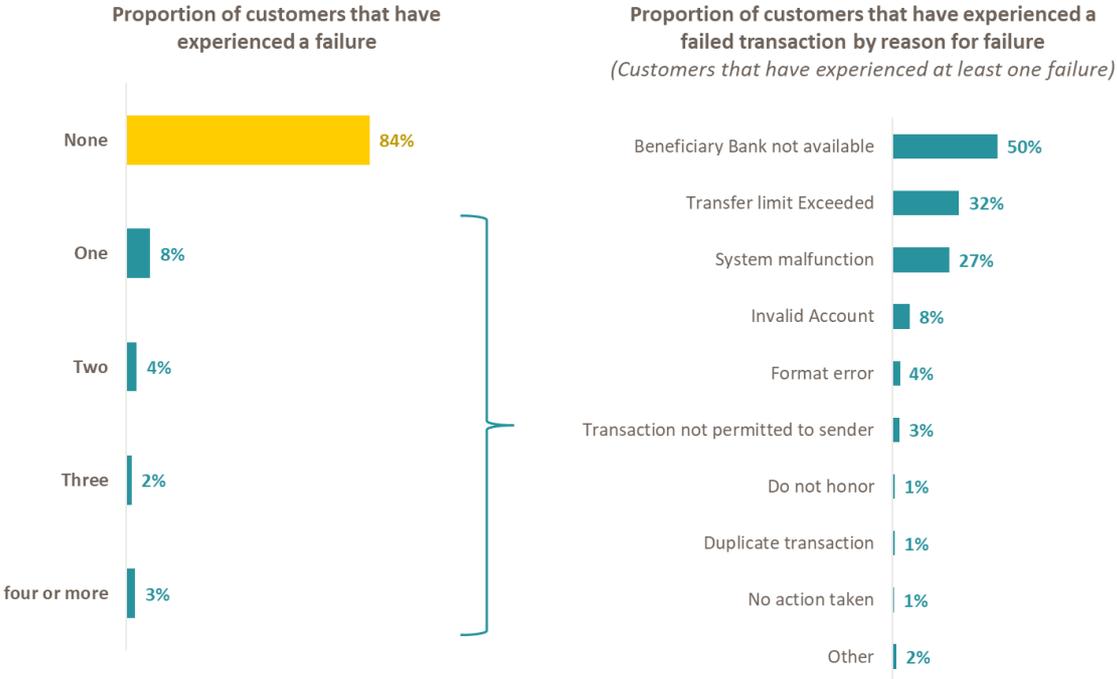
	First visible channel in sample	% who did not transact again using NIP	% that have conducted at least one subsequent transaction with the following channel				
			Mobile phone / internet	USSD	Bank teller	ATM	Other
Mobile phone/ internet	39%	6%	93%	27%	22%	5%	1%
USSD	33%	11%	14%	88%	14%	6%	1%
Bank teller	27%	17%	25%	23%	73%	6%	2%
ATM	5%	27%	18%	29%	15%	52%	1%
Other channel	1%	11%	26%	14%	28%	2%	84%

Source: NIBSS data sample

The data generated by NIBSS can also be used to track the number of failed transactions. NIP transaction failures are rare; in most months just 0.1% of transactions failed. The number of failed transactions peaked in November and December 2016. However, at that point, failed transactions accounted for less than 0.5% of transactions. There is no significant difference in failures by channel used.

From a customer perspective, based on NIBSS data, the majority of NIP users (84%) have never experienced a failed transaction. The most common types of failed transactions experienced by customers are illustrated in Figure 29. Many failures are customer driven with 32% of customers exceeding transfer limits (because there were insufficient funds) and 8% providing invalid account information. These failures may indicate opportunities to improve the user interface or enrich information provided to users on some channels.

Figure 29: Proportion of NIP customers that have experienced a failed transaction and the type of transaction failure experienced



Source: NIBSS data sample

Data on failures visible to NIBSS does not include transactions that fail before they can be initiated due to limited or unreliable network. This can be a significant barrier to usage of digital payment channels. For example, 28% of non-linked survey respondents in Lagos that had sent a remittance via USSD said that they had experienced a failed transaction because there was “no network”.

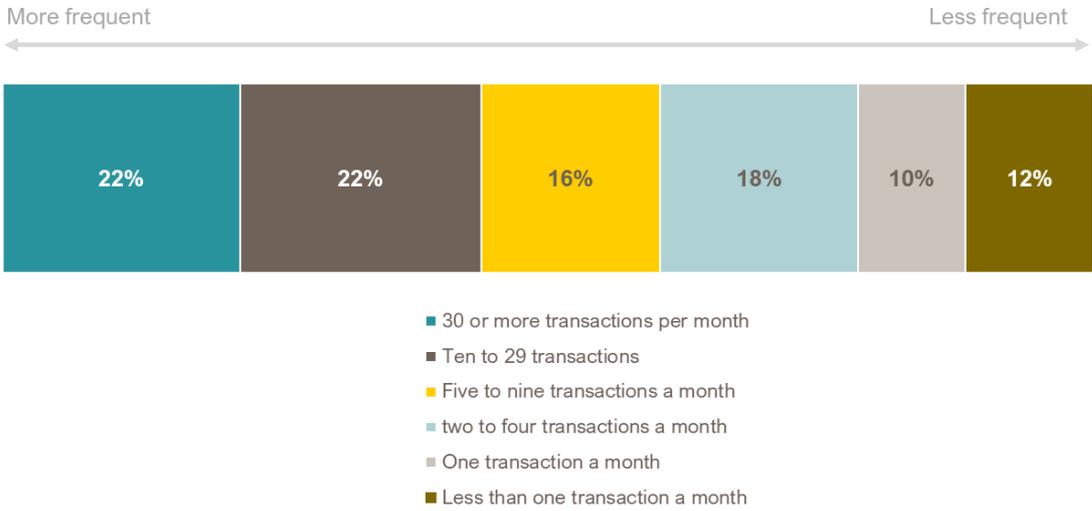
Focus on POS payments

A total of 30,000 unique customers in the data sample made a POS payment in 2017. The history of transactions extends back to May 2014. POS customers are more likely to be male (74%) and between the ages of 25 and 45; more than half of POS customers fit this profile. POS customers are also more likely to live in Lagos, 40% of customers in the sample registered their BVN in Lagos, whereas just 13% of the banked population live in Lagos²⁵.

Unlike with instant payments, *all* POS transactions are captured by NIBSS. POS customers tend to transact much more frequently than NIP customers. Using the same methodology as with NIP, the frequency of transacting is based on the total number of POS transactions conducted *and* the number of months since the customer was first visible in the data sample to get an average monthly frequency. The results are shown in Figure 30. More than 40% of POS customers conduct 10 or more POS transactions per month.

25 Based on EFINA 2018

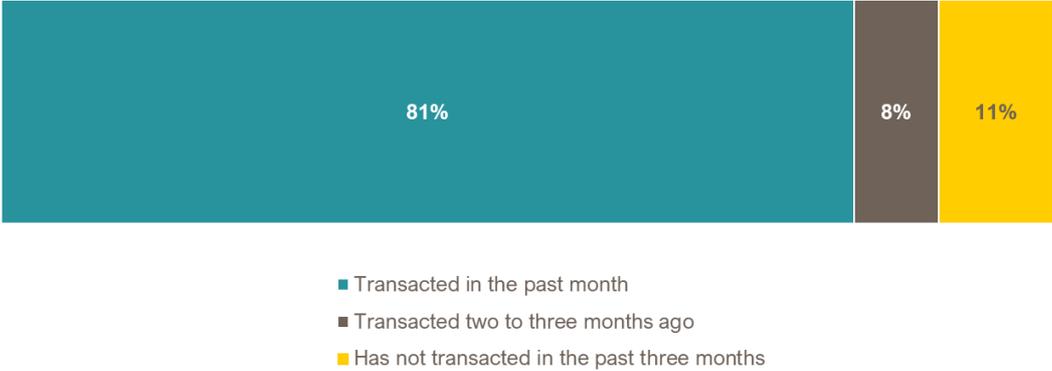
Figure 30: Frequency of transacting – number of POS transactions conducted per month



Source: NIBSS data sample

This frequent transaction behaviour is also reflected in the recency of transactions – 81% of POS customer transacted in the past month (i.e. in December 2017), this increases to 89% when considering customers that have transacted in the past three months, see Figure 31.

Figure 31: Recency of conducting a POS transaction

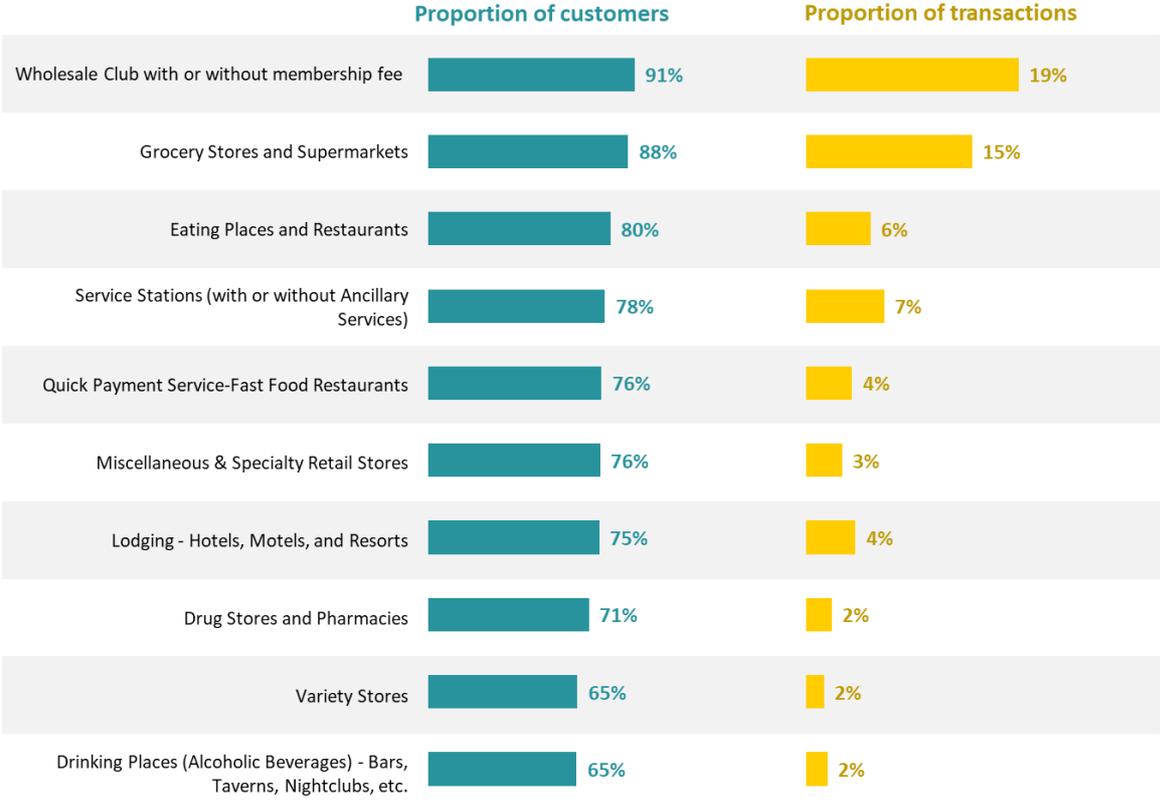


Source: NIBSS data sample

POS terminals are associated with a merchant category code or MCC. This four-digit code is assigned to merchants when they start accepting card payments. The code identifies the type of product or service a business sells, for example there are codes for grocery stores, restaurant and hospitals. The codes can be useful for identifying payment use cases (specific payment needs). However, there is some incentive for merchants to mis-classify their business activity because interchange rates vary depending on MCC code. A review of MCC codes in the data confirms that they are unreliable. As illustrated in Figure 32,

wholesale clubs are the most popular code in Nigeria, but this is not a common retail type in the country.

Figure 32: Merchant Category Code usage (top 10 codes)

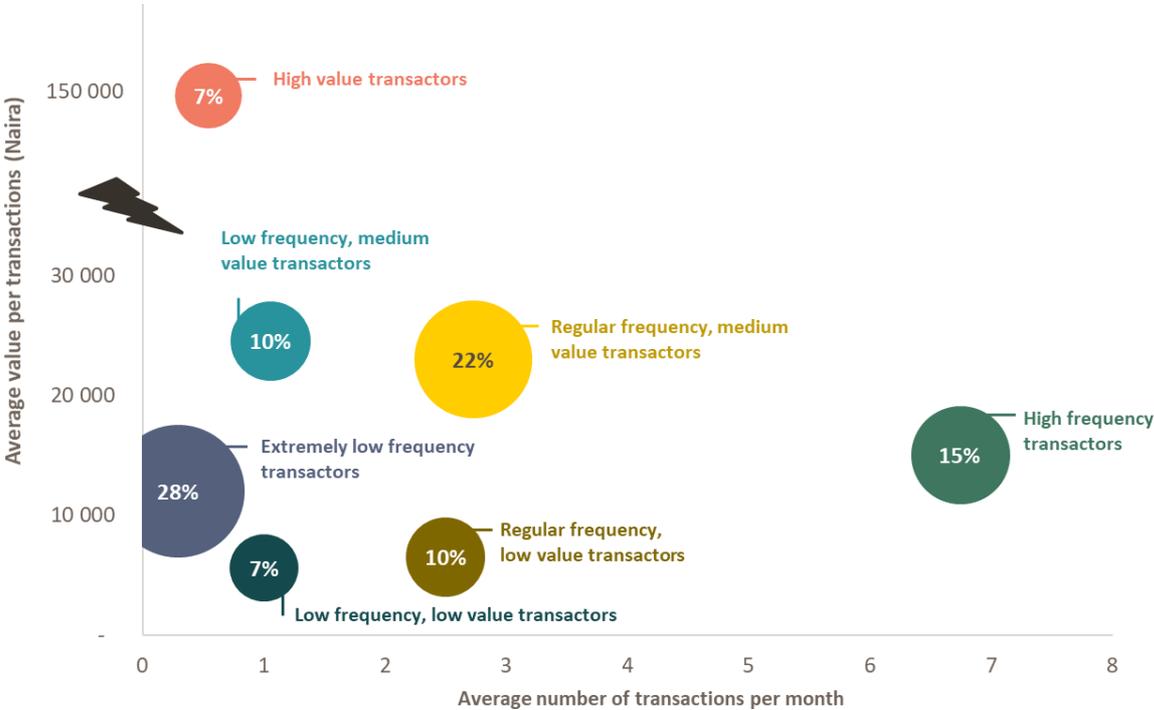


Source: NIBSS data sample

Customer segmentation

A simple segmentation was developed to characterise usage across all the payment platforms visible to NIBSS using an unsupervised K-means clustering methodology. This methodology groups similar customers together based on usage behaviour characterised in terms of frequency of transacting and the value of transactions. From this analysis, various threshold rules were selected to classify the segments. Seven distinct segments were identified, described in Figure 33.

Figure 33: Customer segments based on the average value per transaction and the number of transactions per month (bubbles size = proportion of customers that fall into the particular segment)



Source: NIBSS data sample

The segments are based on usage data generated by NIBSS. However, this data only includes very limited demographic information including age, gender and location. To add additional context to the segments, respondents from the linked survey that fall into each segment have been profiled. Note that in some cases the sample sizes of respondents from the linked survey are small. One respondent in each segment has been selected to create a persona for the segment. Segment profiles are shown in the following section.

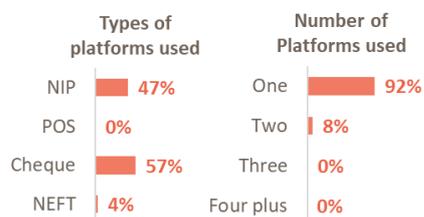
Customer segment profiles

High value transactors

7% of NIBSS customers fall into this segment



Number of transactions per month **0.4**
 Average value per transaction **N 150,000**
 Median monthly spend **N 60,000**



Dominant NIP channel: **Bank teller**



Average age: **50**

- 13 respondents identified in the demand-side survey
- Mostly business owners. Respondent's Incomes are spread, however these respondents have the highest average monthly income relative to other segments
- High value payments appear to be for items such as rent (paid annually), education (paid a few times a year), payments to business suppliers and sending domestic remittances

Profile: Mr Suleiman

Mr Suleiman is 41 years old and lives in Kano. He has completed university and currently owns his own business. He says his income is ₦3.1 million per month - it is unclear if this is his revenue or his profit from his business. He receives the money in cash and deposits some into an account.

Mr Suleiman uses cash to pay for the majority of his expenses, including medical expenses, fuel, food and taxes. He also pays for his children's education in cash, usually a large cash payment (N120,000). He occasionally buys airtime using USSD, but mostly does this with cash

He uses NIP to pay his business suppliers and makes these payments around once a month.

He also sends multiple transfers a month to other areas within Nigeria using NIP via USSD. The last time he sent money was for business purposes.

From a digital migration perspective, the next step would be to digitize payments he receives in his business.

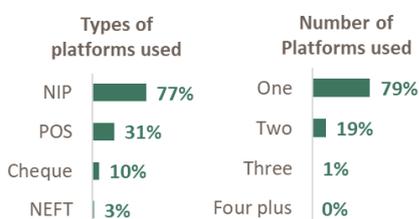
NIBSS data view: 2.5 transactions per month, all NIP, mostly USSD with some being conducted via a bank teller. His transactions have an average value of ₦114,000

High frequency transactors

15% of NIBSS customers fall into this segment



Number of transactions per month **6.8**
 Average value per transaction **N 15,000**
 Median monthly spend **N 130,000**



Dominant NIP channel: **Mobile/ internet**



Average age: **37**

- 93 respondents identified in the demand-side survey
- One third are employed in the formal sector and earn a monthly salary - the highest of all segments. 37% are business owners
- Make numerous payments through their accounts for airtime, clothing, fuel and food. For those that pay business suppliers and employees, half make use of instant payments for these transactions

Profile: Mrs Damilola

Mrs Damilola is 49 years old, she is married and lives in Lagos. She lives in a large house and is very comfortable financially.

Mrs Damilola has completed university and currently receives income from her own business. She makes about N50,000 a week, which is paid to her in cash which she deposits into her bank account.

Mrs Damilola uses her phone app to make numerous instant transfers for airtime and utility bills. She also makes numerous large payments over the year using an instant transfer for rent (N350,000), her children's education (N600,000) and sending money transfers to family members living in other areas (N100,000).

Although she makes numerous payments electronically, Mrs Damilola will usually carry N5,000 with her on any given day because she prefers to hold some cash and finds that non-cash methods of payment don't always work.

NIBSS data view: 5 transactions a month, mostly NIP, and occasionally uses cheque. The average value is around N70,000 (higher than most in this segment). All her NIP's are conducted through mobile phone

Regular frequency, medium value transactors

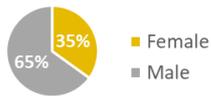
22% of NIBSS customers fall into this segment



Number of transactions per month **2.7**
 Average value per transaction **N 23,000**
 Median monthly spend **N 64,000**

Types of platforms used		Number of Platforms used	
NIP	98%	One	96%
POS	3%	Two	4%
Cheque	6%	Three	0%
NEFT	2%	Four plus	0%

Dominant NIP channel: **Mobile/ internet**



Average age: **37**

- 151 respondents identified in the demand side survey
- Most common non-cash payment is for airtime and domestic remittances; 40% send more than once a month and a further 25% monthly

Profile: Mr Niyi

Mr Niyi is 40 years old, he is married and lives in Lagos with his family.

Mr Niyi has completed university and currently works for a monthly salary in the formal sector. He makes about N80,000 a month, which is paid into his bank account. He usually takes most of this out in cash on receipt.

Mr Niyi uses cash to pay for taxes, medical expenses and when making loan payments and contributions to his savings group. He uses both cash and USSD to purchase airtime. He also sends money occasionally to family members in other areas in Nigeria. Interestingly, Mr Niyi seems to swipe his card for numerous payments including utility bills, public transport, food and fuel (he also pays for food and fuel with cash). He says that he is using both POS and USSD more often than he did last year

Greater availability of digital payment channels at merchants may prompt Mr Niyi to use USSD for food and fuel too.

NIBSS data view: 2 transactions per month through NIP using USSD. Transactions have an average value of N34,000. No POS usage in the NIBSS data

Regular frequency, low value transactors

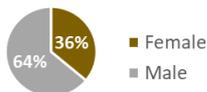
10% of NIBSS customers fall into this segment



Number of transactions per month **2.5**
 Average value per transaction **N 6,500**
 Median monthly spend **N 15,500**

Types of platforms used		Number of Platforms used	
NIP	94%	One	96%
POS	7%	Two	4%
Cheque	1%	Three	0%
NEFT	1%	Four plus	0%

Dominant NIP channel: **USSD**



Average age: **32**

- 59 respondents identified in the demand side survey
- 31% work for a salary in the formal sector, 27% business owners. Relatively low incomes compared to other segments
- Most common non-cash purchase is for airtime. Almost all respondents send transfers family in other area. Most send monthly or more often using NIP via USSD

Profile: Mr Elegbe

Mr Elegbe is 30 years old, he is single and lives in Lagos. He owns a car and can afford to buy certain expensive goods such as a TV.

Mr Elegbe works for a salary in the formal sector. He earns about N55,000 per month into his bank account. He sometimes finds himself struggling to meet all his expenses and often requires a salary advance to get through the month.

On receiving his salary, Mr Elegbe takes most of it out of his account to hold in cash. He uses the cash to pay for most of his expenses including public transport, utility bills, food and clothing. He buys airtime via USSD, although he also purchases airtime using cash from street vendors.

Mr Elegbe usually sends money at least once a month to support his family that live in another state. To send money he uses USSD on his phone because it is quick and reliable.

Mr Elegbe recognises the value of USSD payments but the vendors he uses may lack the infrastructure to allow him to use this payment method more often. Greater uptake of USSD may lead to him keeping more money in his bank account.

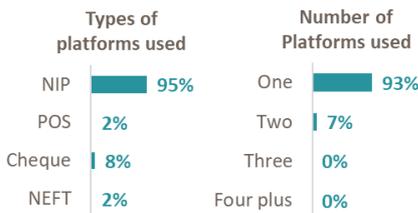
NIBSS data view: 2 transactions per month using NIP via USSD with an average value of N8,500.

Low frequency, medium value transactors

10% of NIBSS customers fall into this segment



Number of transactions per month **1.1**
 Average value per transaction **N 23,300**
 Median monthly spend **N 24,500**



Dominant NIP channel: **None**



Average age: **37**

- 60 respondents identified in the demand-side survey sample
- No dominant income source - 28% are employed in the formal sector and 25% are business owners
- Pay for most expenses in cash. Pay for airtime and send remittances using non-cash payment methods

Profile: Mr Raheem

Mr Raheem is 62 years old, married and lives in Kano.

Mr Raheem works for a monthly salary in the formal sector, although he is hoping to retire in the next few years and trying to save money in his bank account monthly. He makes about N80,000 a month, which is paid into his bank account, but on receipt, he takes about half of this out in cash.

Mr Raheem uses cash for all his regular expenses, which include airtime, transport and food. Mr. Raheem occasionally sends money to his children who live in other states. He sends the money via an instant transfer (NIP) using USSD because it is quick and reliable.

As with other respondents, Mr Raheem recognises the value of digital payments, but the vendors he uses may lack the payment infrastructure to allow him to make digital payments more regularly

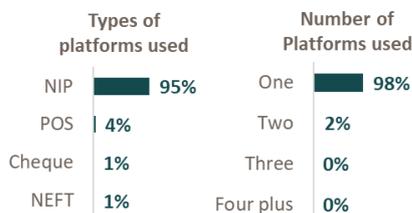
NIBSS data view: One transaction a month using NIP via USSD, with an average value of N19,000

Low frequency, low value transactors

7% of NIBSS customers fall into this segment



Number of transactions per month **1**
 Average value per transaction **N 5,600**
 Median monthly spend **N 5,600**



Dominant NIP channel: **USSD**



Average age: **32**

- 51 respondents identified in the supply-side survey sample
- No specific income source. Lowest incomes of all segments
- Least likely segment to be making payments for larger ticket items such as house rent, education and utility bills.
- Most common non-cash payment is for airtime, many also use cash to purchase airtime and sending remittances

Profile: Mr Yusuf

Mr Yusuf, is 35 years old, is married and lives in Kano.

Mr Yusuf has completed secondary school and currently receives income from his own business, which provides services to his community. He makes about N2,500 a day, although it is unclear if this is profit or revenue from his business. He receives and keeps this in cash at home or at his business premises. He occasionally receives money into his bank account from family members who live in other areas.

Mr Yusuf makes most of his payments in cash, including buying airtime (he also occasionally buys using USSD), food and for public transport. He occasionally makes payments across the country for business purposes, and uses USSD on his phone when he does because the the recipient receives the money instantly

Helping Mr Yusuf receive payments via USSD may be a logical next step because he recognises its value when making remittance payments.

NIBSS data view: one transaction a month using NIP via USSD with an average value of N7,000

Extremely low frequency transactors

27% of NIBSS customers fall into this segment



Number of transactions per month	0.3
Average value per transaction	N 12,000
Median monthly spend	N 3,300

- 73 respondents identified in the demand side survey
- Relatively low incomes compared to other segments
- Payments are dominated by cash; with some using non-cash methods to purchase airtime and for sending domestic remittances

Types of platforms used		Number of Platforms used	
NIP	86%	One	97%
POS	2%	Two	3%
Cheque	11%	Three	0%
NEFT	3%	Four plus	0%

Dominant NIP channel: None



Average age:
37

Profile: Mr Ahmed

Mr Ahmed, is 34 years old, married and lives in Kano. Mr Ahmed sometimes struggles to pay regular expenses and uses cash savings at home when he finds himself short of money.

Mr Ahmed receives income from his own business. He makes about N2,000 a day, although it is unclear if this is revenue or profit, which he receives and keeps in cash at home or at his business premises.

Mr Ahmed uses cash to buy food, pay for medical expenses and contribute to his investments / savings. He uses both cash and USSD to purchase airtime. He makes payments across the country twice a month for business purposes, and uses both cash and USSD to transfer the funds. Mr Ahmed's previous transfer was for N24,000.

From a digital migration perspective, the next step would be to digitize payments he receives in his business.

NIBSS data view: Makes one transaction every three months using NIP via USSD, average transaction size is N40,000

7. Conclusions

The analysis, while exploratory, clearly demonstrates that transactional data is a potentially powerful addition to the more common demand- and supply-side data sources used to monitor adoption and usage of digital payments solutions.

While NIBSS typically reports on the volume and value of transactions processed across its platforms, this analysis used the customer as the unit of analysis. It clearly demonstrates the importance of the NIP in combination with USSD in driving customer adoption of digital payments. This platform-channel combination enables low cost, instant, anytime and anywhere payments subject, of course, to mobile network coverage.

Beyond the analysis showcased in this report, there is much more analysis that the data can support. Further phases of analysis can include dimensions relating to time or day of week as well as longitudinal studies of customer adoption and usage journeys over time, particularly for younger, first time account holders.

As noted, the research was conducted using a randomly generated sample of one million BVNs. While the sample size and structure were more than adequate given the exploratory nature of this research, going forward the sample selection could be aligned with more directed research questions. For instance, there may be some interest in exploring interactions between those who receive regular, relatively large payments in urban areas (who appear to be in formal employment) and those who receive more frequent, irregular or smaller payments.

A primary objective of the analysis was to “square” demand- and supply-side data; as noted the research methodology included gathering demand-side data for a sub-set of customers in the NIBSS sample. This approach is potentially powerful and could provide evidence on the reliability of demand-side data, particularly with reference to detailed payment activity. However, in this specific project the approach was difficult to implement, with a very high drop-off rate because of out-dated contact details and lack of willingness on the part of respondents to participate in a lengthy, face-to-face research process. In addition, the demand-side research was conducted a year after the extraction of transactional data thereby limiting the comparability.

There is an opportunity to refine the demand-side research approach. insight2impact has begun to pilot the use of shorter, more direct SMS-based data gathering methodologies which could be triggered by account activity and which could enrich transactional data significantly. This research approach will require a narrower focus, but it can be implemented more frequently given lower cost.

Going forward, it may be useful for NIBSS to develop standardised documentation and a precise data dictionary for key data tables and variables to ensure that data users are well aware of the underlying meaning and limitations of the data they are working with. In addition, NIBSS may wish to explore mechanisms to improve data quality, particularly where it relies on bank-led data gathering processes. A good example of this would be inaccurately reported MCC codes provided by merchants to banks.

The next phase of Nigeria's financial inclusion strategy focuses on the widespread deployment of shared agents who will offer a range of services, including cash-in/cash-out, money transfer, bill payments and BVN registrations. This initiative, known as the SANEF, has been initiated by the CBN, and aims to deploy half a million registered agents across Nigeria by December 2020. Because NIBSS is the underlying switch that will enable interoperability between agents and banks, its data asset will grow significantly. By leveraging unique customer identifier (the BVN), NIBSS is therefore well-positioned to play a critical *monitoring* role in connection to consumer engagement with SANEF, and the success of Nigeria's financial inclusion strategy more broadly. In addition, other switches, and indeed other banks and mobile wallet providers may be willing to participate in a broader, industry-wide study of consumer behaviour based on transactional data leveraging Nigeria's unique data advantage offered by the BVN.

As the analysis of transactional data becomes more sophisticated and incorporates more data sources, data security and privacy protection will become even more critical issues. On this project all analysis was conducted within the NIBSS environment, and all customer identifiers were hashed. In the future, it may be useful to enhance the protocols developed for this project and to create an industry standard. Aside from guiding analysis of transactional data, these protocols would also inform all research activities that require matching of demand side data.

Finally, the project team benefitted enormously from the patient and generous input of the NIBSS team, and the readiness of executives at NIBSS to engage with findings. insight2impact owes a debt of gratitude to them for their willingness to partner on this critical study.

8. Appendix

NIBSS data assessment

To assess the quality of the NIBSS data the data quality assessment framework²⁶ has been used, which assesses data based on the six categories described in Figure 34.

Figure 34: Data quality assessment framework

RELEVANCE	ACCESSIBILITY	INTERPRET-ABILITY	COHERENCE	ACCURACY	INSTITUTIONAL ENVIRONMENT
<p>Does the data meet the needs of the analysis?</p> <ul style="list-style-type: none"> • What are the general contents of the data? • What unit of analysis can the data support? • What is the coverage or scope of the data? • Over what period of time does the data extend? • How frequently is the data collected? 	<p>Is the data accessible?</p> <ul style="list-style-type: none"> • What kind of limitations exist with respect to data access? • What kind of working environment is provided for the team? • Does this enable the kind of work we need to do? • What protocol is used to mask the data? Is this protocol proprietary? • Is there any data that would be useful, but which cannot be shared? 	<p>Do we understand what the data means?</p> <ul style="list-style-type: none"> • Is there a clear data dictionary? • Do we understand how aggregated fields are generated or grouped? • Is the meaning of each field clearly understood by the entities that populate the data? • Do we understand the process used to select the sample, and what, if any, implications this has for the analysis? 	<p>Is the data comparable with other data sources, including demand side data and other industry / national data?</p> <ul style="list-style-type: none"> • Do product categories, channels and regions align? • Is the data consistent over the time period it covers? (no changes in data collection / extraction processes, categories etc.) • Is there a unique key that enables matching with other data sets generated in other environments? 	<p>Is the data accurate?</p> <ul style="list-style-type: none"> • Are there other data sources that can be used to assess the accuracy of the data? • Are there other data sources or reports that we can use to assess the representivity of the data sample? • Are there duplicate records in the files? • What is the proportion of missing data? • Are there known errors / inaccuracies in the data? 	<p>Is the data environment well run?</p> <ul style="list-style-type: none"> • What processes are used to upload the data into the warehouse? • What processes are used to capture data by third parties who provide data to NIBSS?

Source: Data Quality Assessment Tool for Administrative Data, Iwig W, Berning M, Marck P, Prell M, February 2013 available at <https://www.bls.gov/osmr/datatool.pdf>

Relevance

The NIBSS data sample includes transactions data for key platforms including POS, instant transfers (NIP and mCash), batch transfers (NEFT), direct debits (CMMS) and cheque transactions. There is no data for “on-us”, ATM withdrawals or cross border transactions. In addition, there is no balance data.

NIBSS data is structured in terms of transactions (each row of the data table is a transaction). Each transaction is associated with an account number that can be linked back to a unique BVN. A BVN becomes visible to NIBSS only through a transaction. By definition, these BVNs have had some transaction activity – including either debit or credit

²⁶ Data Quality Assessment Tool for Administrative Data, Iwig W, Berning M, Marck P, Prell M, February 2013 available at <https://www.bls.gov/osmr/datatool.pdf>

transactions (i.e. accounts could be payee/beneficiary or payer accounts). A sample of one million BVNs was drawn for this study, of which around half have made a payment²⁷.

For selected BVNs the transaction history was pulled from December 2017. On some platforms the transaction histories extend as far back as 2014. However, for some of the smaller platforms the history only extends for the past six months (CMMS), or past 12 months (mCash). Older data appears less reliable, so the team considered transaction histories over the past 18 months or past 12 months, depending on the platforms under consideration and the analysis being conducted.

With the exception of POS transactions, only interbank transactions are visible (NIBSS has been appointed as the Payment Terminal Service Aggregator for the country, so all POS transactions in Nigeria go through NIBSS). This means that the *data cannot support a comprehensive analysis of usage*. It can only explore usage with regard to interbank transactions. Subject to this constraint, the analysis can identify those customers who transact over multiple accounts, and it can explore usage of platforms and channels.

All transactions include a time and date stamp and so the data can support an analysis over time. The data also includes a response code or return reason code, which can provide an indication of reliability and reasons for unsuccessful transactions. We note that DFS transaction errors have been identified as a key indicator in the revised financial inclusion strategy. With regard to NIP transactions, the data includes a field for channel, including branches, ATM, Mobile and USSD. The POS data includes a merchant code for all transactions, as well as unique identifiers per POS terminal.

Aside from transactions data, the data includes some demographic data for each BVN, including age, gender and location.

Accessibility

The team could access the data from locations in Nigeria. BVN and account numbers have been masked using NIBSS's own anonymisation algorithm to ensure data privacy.

Interpretability

Beyond the data schema provided to the team, there is no official data dictionary. The team therefore relied on NIBSS personnel to explain specific fields verbally. Going forward, a data dictionary should be created clearly specifying all fields contained in each table.

Descriptive data for customers and merchants is derived from forms completed and captured within bank branches. The team therefore visited a bank branch to obtain copies of these forms. In some cases, this data may not be accurately provided or accurately captured.

Coherence

The data appears stable and consistent over the past 18 months.

²⁷ Some customers may have received a payment but not made a payment. In addition, some banks did not include the account number of the payer for transactions, in these cases the transactions could not be linked back to a customer.

Some platforms could not be analysed in detail because of limited usage. For example, the mCASH platform was only launched in 2016 and because the data only included transactions up to December 2017, usage on this platform was limited and appeared to be skewed by test transactions (high frequency of very low value transactions).

Because BVN data has been anonymised using a proprietary hashing algorithm, data cannot be easily augmented and matched to other data (including other transaction data generated by banks or data collected from other government agencies). While it is technically possible for NIBSS to re-hash the data using standard algorithms, NIBSS is reluctant to do so as they fear this will compromise the security of the data.

Accuracy

Because transactions data is generated directly from the operational environment it is likely to be very accurate. However, data provided by customers and merchants on BVN and POS application forms may not be. It is also less complete; in some cases, address and contact details are not available for customers. This data is gathered during the BVN registration process and may not provide an accurate picture of where the customer is currently located as there is no standard process to update or confirm data on an on-going basis.

Likewise, merchant data is gathered from merchants during the process of applying for POS terminals. Merchants select an industry from a list, which includes a category for Other (specify). In some cases, this data is not provided. In addition, location data provided by merchants does not necessarily align with the location of the terminal. For instance, where a merchant applies for 20 terminals to be deployed in more than one state, the merchant may only provide one address, associated with a head office. Beyond this, POS terminals can be moved and are not tracked.

Institutional environment

It appears that sound processes are in place to manage and protect data. The personnel at NIBSS are very helpful and capable.

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