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Teachers' Attendance and Pupils' Human Capital Formation: Anecdotes from Rural Schools in Nigeria

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Abstract

The learning and education crises in developing countries are often linked to diverse factors, including low teacher presence in schools, teachers' absenteeism, low utilisation of their skills, and available resources for teaching. We ask whether improving teachers' accountability in Nigeria might yield important learning gains for vulnerable children. Although the advocated programme is the introduction of digital technologies in the classroom to ensure teachers' accountability in school and class attendance, this study aimed to generate evidence to inform the efficient implementation of the technological adoption, and to ensure clear identification of the influences of teachers' accountability on pupils' learning outcomes. Using a mixed analytical approach for a field survey in Osun State, Nigeria as a case study, we show that the manual attendance system for teachers is ineffective in improving teachers' school attendance and pupils' learning performances because it is prone to manipulation, suggesting the need for a more technologically advanced teacher attendance system.

Keywords: absenteeism; education; human capital; pupils; teacher

Introduction

The hallmark of policies engineering accountability in educational systems is to improve the performance and achievement of students during learning and the formation of human capital. However, education and teaching policies in countries in sub-Saharan Africa have not yielded significant learning gains compared with other regions of the world. International test score data show that student learning outcomes are often poor in sub-Saharan Africa, with a significant number of students still having limited literacy or numeracy skills even after several years of schooling (Adeniran et al. 2020; Bold et al. 2017; Evans and Acosta 2021). This situation is often characterised as the “learning crisis” (World Bank 2018), caused by diverse factors, including low teacher presence in schools, teachers’ absenteeism, low utilisation of their skills, and a lack of available resources for teaching.

Teacher absenteeism is ubiquitous in the sub-Saharan Africa region, with rates higher than in other regions worldwide. At the primary school level, teacher absenteeism ranges from 11 per cent to 30 per cent, with Kenya and Uganda leading with absenteeism rates of 30 per cent and 27 per cent, respectively, while Nigeria is among the top 20 countries with high absenteeism rates for the periods 2004 to 2011 (Transparency International 2013). Such high absenteeism rates come with significant economic and social costs: UNICEF (2021) approximates a loss of 46 cents for every United States (US) dollar invested in education because of low teacher inputs in teaching engagement in the region. Noting these issues, there is a need for greater emphasis on improving accountability structures in schools to ensure a comprehensive learning experience for pupils in this region.

Studies have shown that policies that are targeted at teachers’ accountability yield dichotomous outcomes such as positive effects of the accountability movement (Figlio and Leob 2011) and unanticipated and negative consequences of teachers’ relationships with students (Valli and Buese 2007). Unlike the manual attendance system, which is laden with shortcomings, we expect that the adoption of digital technologies to improve the accountability of teachers will be effective in improving pupils’ learning outcomes in this region, noting that school monitoring and management are essential to promote teacher availability in the classroom and reduce school/classroom absenteeism (Majgaard and Mingat 2012). This is a crucial supply-side factor, as teachers showing up to their jobs, facilitated by some intervention, significantly affects pupils’ learning outcomes. For example, studies considering a similar issue have innovated with local schemes that rely on head teachers and parents monitoring teachers in Uganda (Cilliers et al. 2014) and electronic monitoring using camera systems in India (Duflo et al. 2012). These studies found similar upward learning trajectories for pupils, arguing that introducing such systems creates a monitoring effect that influences teachers’ behaviour because they fear being held accountable for their actions. Although Banerjee et al. (2008) argue that a similar intervention proposed in this research is littered with system sabotage, there is limited evidence on the underlying issues that may shape the outcomes

of such interventions. Therefore, given the risk of counterproductive outcomes from setting up an accountable system for teachers, this study analyses the initial conditions relevant to adopting technologies to aid teachers' accountability, especially in rural schools in Nigeria.

Specifically, this study attempts to understand the feasibility of harnessing technologies to improve teachers' attendance and, subsequently, pupils' educational and mental outcomes. To achieve this objective, the issues for consideration include appraising the factors that determine teachers' class and school attendance in the study's context; the influence teachers' attendance has on pupils' academic and non-academic outcomes; how teachers and head teachers perceive the introduction of a new technology to capture teachers' attendance and the extent to which there is a divergence or convergence in their perceptions; the political economy implication of the introduction of this new attendance system; and how compliance can be achieved for teachers and head teachers. Overall, the essence of this study is to understand the factors that might inhibit the successful system accountability structures while taking note of other localised and contextual issues that may be relevant to improve technological adoption that can aid accountability.

Using mixed method analytics, our findings are comparable with the national average absenteeism rate of 29 per cent among primary school teachers in Nigeria. The interviews with education policymakers highlighted some of the causes that aggravate absenteeism, including remoteness of schools, low monitoring of attendance from the central regulatory office, and inadequate teacher personnel to ensure adequate within-school internal controls to check the activities of other teachers. Sixty per cent of the head teachers supported the implementation of an attendance monitoring machine in their school. We found some positive correlations in the approximate hours spent out of school and missing school at least once in the last school term (i.e., a 40 per cent decline). Meanwhile, the results suggest that the class teacher resuming late is negatively correlated with the overall pass rate, while there is a 35 per cent increase in the likelihood of having at least one student that manifests negative mental emotions for the classes of teachers who have missed school at least once in the past term, thus demonstrating that school absenteeism by teachers is correlated with students' negative emotions.

The remainder of this study is structured as follows. Section 2 describes the policy issue motivating this study Section 3 describes the study context, while Section 4 discusses the approach of this current fieldwork, including its quantitative and qualitative aspects while describing the motivation and intended outcomes for this phase. Section 5 presents some field evidence, results, and discussions. Section 6 summarises and concludes the study.

Policy Issue

The past two decades have seen an emphasis on and expansion of primary school access in many developing countries to achieve the United Nations Development Goals (both the Millennium Development Goals and Sustainable Development Goals) for quality primary education completion, leading to relevant and effective learning outcomes. This is especially true in sub-Saharan Africa, which has seen an increase in spending on post-basic education (per capita GDP) relative to most other developing countries (Majgaard and Mingat 2012). However, the improvement in school access has not translated to learning gains in this region, with a significant number of students still having limited literacy or numeracy skills even after several years of schooling.

Nigeria is not exempt. Despite increased spending on education, the country still records the highest rate of out-of-school children globally (about 10.5 million children, or one-third of all school-age children) and the highest proportion of out-of-school children in the world (one in every five out-of-school children). Such poor learning outcomes in Nigeria and other sub-Saharan Africa or developing countries may in part be the result of teacher absenteeism. Twenty-nine per cent of Nigerian primary school teachers have been absent regularly, at least once a week, a high absenteeism rate comparable to the 11 to 30 per cent rate recorded for developing countries (Akseer and Jativa 2021). While some teachers often lack incentives to attend work owing to poor teacher management and working conditions (Mashaba and Malie 2018; Rogers and Vegas 2009), others are engaged in other forms of business owing to low financial incentives that inhibit their teaching activities (Agboblle 2016; Duflo et al. 2012), thus limiting the prospect of the attainment of the country's progress toward attaining the Sustainable Development Goal.

Several rigorous studies have evaluated successful interventions to address teacher absenteeism in the context of other developing countries, such as increasing teachers' incentives, the provision of teaching aids and tools, the use of rewards and punishments implemented by external monitors, and facilitating greater involvement of those who expect to benefit from the service (Banerjee and Duflo 2006; Knoster 2016; Usman et al. 2007). However, there has been relatively little emphasis on the assessment of the initial conditions in harnessing an integrated intervention that blends local schemes with a technology-assisted monitoring technique to address absenteeism. Therefore, the potential effectiveness of this intervention and its impacts on other educational and human capital development outcomes of pupils in rural Nigeria are also not known.

In 2020, the Osun state government in South-West Nigeria began its education transformation agenda by focusing on policies aimed at improving school infrastructure and teachers' attitudes to work. For the latter, the government focuses on monetary incentives, by ensuring regular salary payment and facilitating teacher training for improved service delivery. Irrespective of this initiative, Osun state is one of the two states with over half (53%) of the school-age children reporting not going to school because of teachers' absenteeism or school closure (National Bureau of Statistics and

United Nations Children’s Fund 2022). This study, therefore, probes the local settings or context that can enhance the viability of an attendance innovation with the potential for better teacher-school and classroom accountability.

Context of the Study

Education System in Nigeria

Nigeria is Africa’s most populous country, with over 200 million people and a diverse ethnic landscape of over 250 groups. The most influential tribes are the Hausa/Fulani in the North, Yoruba in the West, and Igbo in the East. The education system in Nigeria is modelled on the British system and consists of formal primary, secondary, and tertiary education (see Figure A1 in the appendix). Apart from preschool, which is usually not regulated, the formal primary school age of entry and completion is 6 to 11 or 12 years, and then onward to the junior secondary school, with an entry age of 12 to 15 years. The senior secondary school or technical college, depending on the path chosen by the individual, and tertiary education have an entry and exit age of 15 to 18 years and 18 to 22 years, respectively. Nonetheless, there is a dissimilar geographic distribution in education access and quality, with a higher share of primary school completion in the South (dominated by Igbo and Yoruba) than in the North (dominated by Hausa/Fulani).

In 1999, Nigeria witnessed the return of the democratic system, with the relaunching of the Universal Basic Education (UBE) scheme to improve access to primary and basic education. Since 1999, formal education has been free and compulsory up to the age of 15 (International Labor Organization 2005), comprising basic education—that is, primary and junior secondary education (see Figure A1). Despite this, about 10.5 million children, or one-third of all school-age children, are not attending school. It is estimated that 35 per cent of Nigerian children who attend primary school do not continue to secondary school (UNICEF 2022). The average net primary enrolment rate in the period 2004 to 2020 was around 66 per cent, well below the average rate for sub-Saharan Africa (72%), and the world average of 88 per cent (World Bank 2022).

School Administration and Teachers in Nigeria

The Federal Ministry of Education (FME), through the National Council of Education, is responsible for the harmonisation of educational policies and procedures in all states in Nigeria. At the state level, the state Ministry of Education collaborates with the FME in such harmonisation processes. The core responsibilities of the state’s Ministry of Education are implementing government educational policies, such as revising primary and secondary school curricula, and close collaboration with the universal basic education board and other government and non-governmental organisations to ensure improved access and quality of education. Nonetheless, school administration is non-unified across states, with each state having varying policies and administration mechanisms.

Osun State, located in the South-West region of Nigeria (see Figure A2 in the appendix), which is the study site, has a decentralised school administration system and has established specialised government units for different key educational levels. For example, the State Universal Basic Education Board (SUBEB) oversees the administration of 1319 state-owned primary schools across its 30 local government areas. SUBEB also supervises the administration of state-owned junior secondary schools, while the Senior Secondary School Commission is in charge of the administration of state-owned secondary schools. As earlier stated, the preschool level is highly unregulated and mostly managed by the private sector. The critical goal of decentralising the school administration structure is strengthening public education services' administrative capacity.

In summary, primary school head teachers, class teachers, and pupils are under the administration of SUBEB, and the board plays a crucial role in the hiring and retention of head teachers and teachers. In 2018, there were about 6588 primary school teachers employed (5188 female and 1400 male), with a total pupil enrolment of over 212 641 students for all the primary school classes (106 601 for boys and 105 518 for girls). Based on these statistics, the teacher-pupil ratio for primary schools in Osun state is one primary school teacher to about 32 pupils, lower than the average for Nigeria in 2010 (1:38), but higher than the average for low and middle-income countries (1:25) and the world average (1:21) in 2018.

Learning Outcomes in Osun State and Nigeria¹

Literacy rate, which is the ability of an individual to read a short simple sentence based on school attendance and the effectiveness of the primary education system, reflects poor learning progress for Osun State. Eight per cent of male and 16 per cent of female residents of Osun state who have completed only primary education are not able to read a short sentence presented to them in English, which is higher than the national average and residents of a major metropolitan city such as in Lagos state (see Figure 1). A similar higher deficiency in effective reading is shown for residents of Osun state who have completed only junior secondary education. They are 33 per cent more likely to be unable to read a complete sentence presented to them compared with the average female in the country, and 67 per cent more likely than the average female who is resident in Lagos state, Nigeria. The same pattern is seen for their male counterparts: they are more likely to be unable to read a complete sentence compared with their contemporaries who are residents in Lagos and other locations in the country.

1 The statistics in this session comes from the National Bureau of Statistics and United Nations Children's Fund (2022).

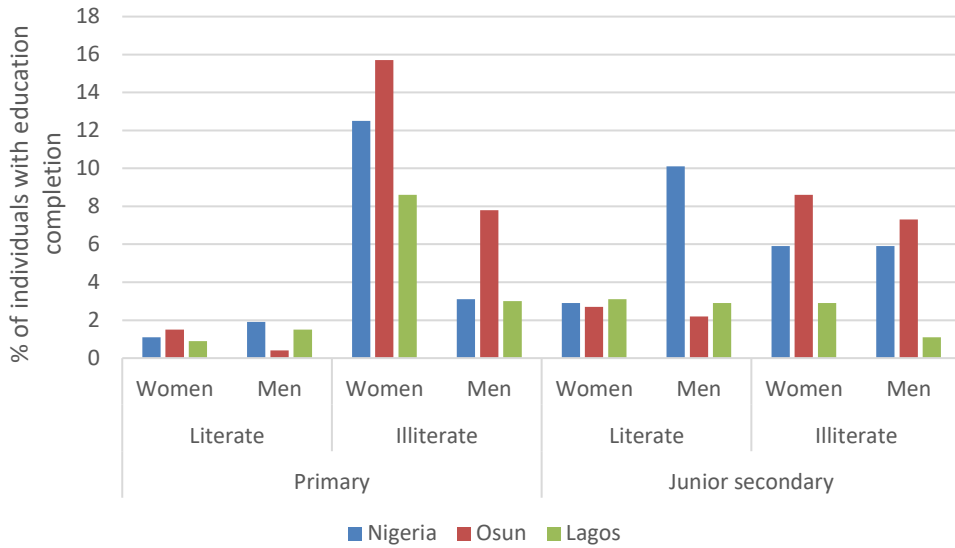


Figure 1: Literacy rate by completion of basic education. Note: The literacy rates show the proportion of individuals with similar educational completion who are able or unable to read the complete sentence in the English language. The survey design in the computation of this data is such that those who have ever attended junior secondary or higher education are immediately classified as literate, owing to their education level and are therefore not asked to read the statement. All individuals who successfully read the statement are also classified as literate. Source: Computations from the Multiple Indicator Cluster Survey 2021, by the National Bureau of Statistics and United Nations Children's Fund (2022).

While acknowledging that there may be diverse explanations for this learning gap, particularly that the proportion of persons who have basic education and are unable to read a complete sentence is higher in Osun state than the national average, one specific culprit that forms the basis for this study is the extent of teacher absenteeism in this state compared with other regions of Nigeria. In Nigeria, 72 per cent of children were unable to attend classes in the last year owing to teachers' absence from school/classes or school closure. However, this percentage is higher for children who attend public schools (75%) than for those who attend non-public schools (67%). The South-West region of Nigeria experienced the lowest (56%) pupil school attendance owing to teachers' absence from school/classes or school closure, while Osun state is one of the two states with over half (53%) of the school-age children reporting not going to school because of teachers' absenteeism or school closure. This school administration pattern may explain the reason for the low literacy rate in Osun state, combined with the state recording the lowest percentage (15%) of children who at home use the language also used by teachers at school.

Theoretical Framework and Methodology

Theoretical Framework

This study syncs the theory of school-based accountability with the theory of planned behaviour. Figlio and Loeb (2011) reveal that the theory of school-based accountability underscores the process of evaluating school performance based on student performance measures. Accordingly, accountability systems create sanctions or rewards for schools based on the overall performance of students in standardised tests. The theory holds that students' outcomes are tied to the extent to which schools are held accountable (Dee and Jacob 2009). The theory of planned behaviour (TPB), also referred to as the theory of reasoned action, analyses the beliefs that influence a person's intention to act in a particular manner or behave in a specific way based on three conditions, namely behavioural beliefs, normative beliefs—behaviour that draws from peers and role models—and controlled beliefs or perceived ability to conduct oneself in a particular way. This theory usually applies to people and providers from expected interventions (Etheridge et al. 2023).

The TPB is largely influenced by external conditions that inform a person to act in a particular way. The adoption of technological monitoring of teachers' attendance aligns with the school-based accounting framework by highlighting digital accountability that can influence teachers' behaviour for performance. This is measured by the improvement in attendance, which directly contributes to students' learning outcomes. Meanwhile, this study hypothesises that the school-based accountability theory will be subject to certain initial conditions and contextual issues peculiar to a local environment. Therefore, some of these background issues are brought to the fore. The possibility of implementing and the potential influence of an accountable system in primary schools are analysed using the schools in Osun state in Nigeria as a reference for the study.

Methodology

To provide evidence underpinning the need for rethinking the monitoring of teacher attendance in rural schools in Nigeria, we conducted field surveys and key informant interviews (KIIs) to show the condition of the education system in this context. This field surveys occurred between January and February 2023. Twenty KIIs were conducted among policymakers, education stakeholders, and managers in the state, while for the field survey, we sampled 100 primary school teachers from 17 schools spread across three local government areas (LGA) in three senatorial zones in Osun State, Nigeria. We selected 100 teachers owing to budget and logistic limitations, as the fieldwork period coincided with the political campaign season and school calendar disruptions owing to insecurity.

Table 1: Rural LGAs in Osun State and number of public primary schools (Source: Osun State Universal Basic Education Board)

LGAs	Senatorial Districts	Number of Schools	Number of Schools Visited	Number of Teachers
Ifedayo	Osun Central	20		
Odo-Otin	Osun Central	50	5	30
Atakumosa West	Osun East	45		
Atakumos East	Osun East	70		
Ife North	Osun East	56		
Ife South	Osun East	97	7	40
Obokun	Osun East	53		
Ayedaade	Osun West	71	5	30
Egbedore	Osun West	34		
Ejigbo	Osun West	61		
Irewole	Osun West	65		
Isokan	Osun West	59		
Olaoluwa	Osun West	38		

In Osun state, we systematically determined the LGA to visit based on the total number of public primary schools within each LGA. The LGA with the highest number of public primary schools was selected in each of the three senatorial zones in Osun State. We then proportionally assigned the number of schools to visit in each of the LGAs based on the population of schools present in such LGAs, such that the LGA with more schools has a higher number of schools to be visited (see Table 1). We randomly selected those schools to visit from a pool of schools within the selected LGAs. We then selected the first teacher from the list of teachers in the school register for each class, from primary 1 to primary 6. Hence, six primary school teachers, spread across the six classes, were selected for each school visited in the selected LGAs.

After obtaining ethical approval from the review board of the university, we proceeded to survey the head teacher for each of the schools visited. Hence, we surveyed 100 teachers and 17 head teachers. We secured consent to participate from the selected teachers and head teachers. The survey focused on information related to sociodemographics, teaching experience, student record, student mental health condition, class size, class performance, attendance record, attitude to teaching, perception of different teacher attendance styles, head teacher information, school management information, and head teacher perception of attendance systems. This was with a view to assessing the factors that determine teachers' class and school attendance in the study's context and the influence teachers' attendance has on pupils' academic and non-academic outcomes. Correlation and regression analysis were used for analysis and the results discussed.

We also engaged in qualitative KIIs for education policymakers in Osun State and other stakeholders whose opinions would inform our understanding of the potential use of a technology-based attendance system. We interviewed 20 officers from across different

sectors and influences, including the Osun State Universal Basic Education Board, community school boards (comprising community leaders), State Ministry of Education, and Parent Teachers Association members. The interview sessions involved discussions, such that the interviewer led the officers in a conversation, following a predetermined clear script and themes. With the participants consent, each session was recorded and later transcribed by a professional transcriber. The interview manual covered diverse topics, ranging from the current state of teachers' attendance and potential public policy for improved teachers' attendance, the feasibility of different attendance systems, issues of compliance for a potential digitised attendance system, current infrastructural concerns in schools, and the political economy of deploying digital attendance technologies and the potential backlash from such a system. The responses generated were categorised thematically and then discussed.

Results

In this section we discuss the findings from our fieldwork regarding the determinants of teachers' class and school attendance, teachers' attendance and pupils' academic and non-academic outcomes, and teachers' and head teachers' perceptions regarding the potential introduction of a digital attendance system to improve attendance capturing. We also discuss evidence from the KIIs and highlight policymakers' perceptions about the viability of the deployment of digital attendance technology to rural schools in Osun state within the political economy context.

Factors Determining Teachers' Attendance in Osun State

This section examines those factors that determine teachers' class and school attendance in this study's context. It considers diverse indicators but emphasises the effectiveness of school management and attendance monitoring in ensuring improved teacher school and class attendance. To achieve this, we briefly define the relevant indicators for our analysis as follows.

Teacher Attendance

We rely on five indicators to measure the extent of teachers' school attendance in this study's context. They include school resumption time for each teacher (*school resumption time*), school closing time (*school closing time*), approximate hours spent out of school during school hours (*hours outside*), and the number of days the teacher has missed school for any reason—1 if missed at least once (*teacher missed school*). These indicators are self-report measures and are confronted by diverse limitations, including measurement and social desirability bias. However, the essence of this exercise is to have a sense of the association between monitoring and teacher attendance within the study's context and to appreciate the need for enhanced monitoring as a policy issue

The average teacher in the sample resumes school by about 7.30 a.m. Figure 2 displays the parallel description of the official school resumption time and teachers' actual resumption time. It shows mostly compliance, except in 30 per cent (or a third) of the schools where, on average, teachers report a later resumption time relative to the official school resumption time. The average teacher closes and leaves the school by exactly 2.00 p.m., the official school closing time in Nigeria. These two statistics suggest that the average teacher in the sample resumes and closes school following the school period's official guidelines. Our statistics, based on a question regarding the average time in a week that the teacher or some other teachers spend outside of the school premises, also show that the average teacher spends about 40 minutes during their official working hours outside of the school premises. The summary statistics of the other attendance indicators show that on average 28 per cent of the teachers in the sample have missed school at least once in the last academic term. Our statistics are comparable with the national average rate of absenteeism by primary school teachers in Nigeria, which is currently at 29 per cent (Akseer and Jativa 2021).

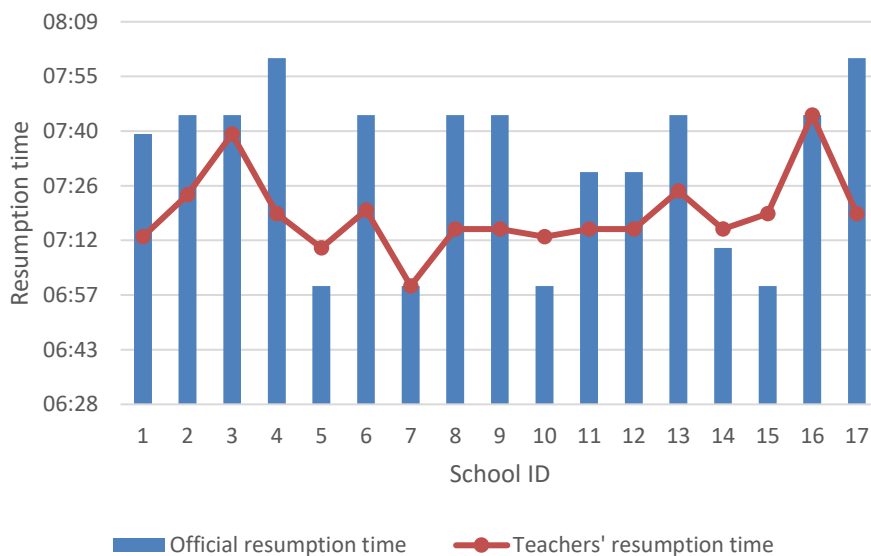


Figure 2: Description of school and teacher resumption time. Note: The official school resumption time was taken from the head teacher survey, where the head teacher was asked the school's official resumption time. The teacher was also asked to state their average resumption time in a typical week. Figure 3 was generated based on this information. Source: Evidence from field survey.

School Management and Attendance Monitoring

In this context, we consider attendance monitoring indicators from diverse school management perspectives, including a binary indicator if the school has the teacher attendance record system (i.e., school has attendance record), the intensity of attendance signing (i.e., whether attendance is also signed in classroom), corrective actions for

teachers who do not sign attendance, particularly whether any teacher has been punished for missing school. We also consider head teachers' perspective regarding attendance monitoring, which could be an indicator of potential attitude towards stricter monitoring of attendance. This argument rests on the assumption that intentions are the immediate antecedents to behaviour, based on the TPB (Ajzen 1991).

Forty-two per cent of the sampled schools had an attendance-capturing system for teachers, based on the responses of school head teachers to the question of whether the school had a teacher attendance record system. Concerning the intensity of class attendance signing, 30 per cent of the school teachers agreed that their school ensures that teachers sign both school attendance and for each class they attend. Regarding corrective measures, that is, whether it is known whether any teacher in the school who has missed attendance has been punished for such action, only 24 per cent answered in the affirmative, while 76 per cent said they did not know anyone corrected for missing attendance. Recall that about a third of all teachers in the sample have missed school once: hence, since 76 per cent of the head teachers report that they do not know of anyone reprimanded for missing classes, one can begin to think about the lags in absenteeism in this context. When asked about their perspective regarding a better attendance monitoring system, 60 per cent of the head teachers agreed that they would definitely support the implementation of an attendance monitoring system in their school. The other 40 per cent who did not support the implementation of an attendance monitoring system in their schools were those who predominantly (70%)² do not believe that this kind of initiative will affect teachers' attitudes. Therefore, enforcement of this new policy will be an essential component of the new policy, as will be further discussed in a subsequent section.

Results and Discussions

The analysis in Table 2 considers other teacher and school characteristics, including age, experience (teaching in school and overall teaching experience), education qualification (1 if university or post-university education), class size, the age of the school, and quality of available infrastructure (the number of buildings/classroom blocks that are in the school and the number of staffrooms for teachers in the school). The estimates report correlational evidence that accounts for unobservable time-invariant differences that vary by school or head teacher, day of the interview, and school location. For example, the specific unobserved geographical peculiarity for schools in certain locations or even teachers' work attitudes that are peculiar to certain days of the week may influence the predicted associations. Therefore, to account for these unobserved variables in the regression analysis, all the estimations presented in our analysis account for these issues by including fixed effects at the geographical

2 On the contrary, 30 per cent of head teachers who support this initiative agree that it will improve teachers' attitudes towards school and class attendance.

School has attendance record	1.372 (1.319)	-1.203** (0.447)	0.313* (0.159)	-0.403*** (0.106)
Intensity of attendance signing	-2.075 (1.710)	0.354 (0.372)	-0.109 (0.167)	-0.388* (0.207)
Corrective actions for teachers	-1.458 (1.721)	0.432 (0.284)	-0.530*** (0.155)	-0.190 (0.187)
Head teacher's perspective	-0.265 (0.691)	0.634*** (0.140)	-0.203*** (0.067)	-0.211*** (0.052)
Obs.	100	100	100	100
R-square	0.294	0.466	0.324	0.395
Fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Note: The following covariates were included in the estimation: teachers' age, the number of years teaching in school, overall teaching experience, education qualification (1 if university or post-university education), and class size. The school characteristics are the age of the school and the quality of available infrastructure, such as the number of buildings/classroom blocks that are in the school and the number of staffrooms for teachers in the school. The fixed effects are the geographical location/LGA and interview date levels. We clustered the standard error at the school level.

Teachers' Attendance and Student Outcomes

In this section we examine the relationship between pupils' outcomes and teacher attendance. We considered two pupils' outcomes, including the average class pass rate, which we confirmed from the teachers' record that shows the number of pupils who passed the previous terms over the total number of students in the teachers' class in the reference term. The average overall pass rate for the sampled teachers' class was 69 per cent (the minimum was 10% while the maximum was 99%). The second indicator was pupils' mental health condition, measured as a binary indicator if there was at least one pupil in the class who thought less of themselves, felt depressed, incapable of achieving much, anxious, and fearful of the future. Twenty-four per cent of the teachers' classes had at least one student with all of the negative feeling.

Figure 3 shows correlations estimated with the inclusion of similar covariates, as in the previous section. Estimates are for models with the two fixed effects and standard errors clustered at the school level. For estimates considering the student average pass rate in Figure 3A, the result suggests that the class teacher resuming late was negatively correlated with the overall pass rate, although this correlation was not statistically significant at the traditional levels. The opposite is seen for classes where teachers close late: pupils in such a class report a higher overall pass rate. Again, this estimate was not statistically significant at the one or five per cent level. Although still statistically insignificant, the estimated coefficient of a teacher spending more hours outside the school during office hours and missing school is negatively associated with the overall average pass rate.

The most interesting correlation is seen in Figure 3B for the estimate that shows how pupils' mental health responds to teachers missing school at least once in the last term.

It suggests a 35 per cent statistically significant increase in the likelihood of having at least one student that manifested any negative mental emotions for the classes of teachers who have missed school at least once in the past term. This result demonstrates that school absenteeism by teachers is correlated with students' negative emotions in the context of this study.

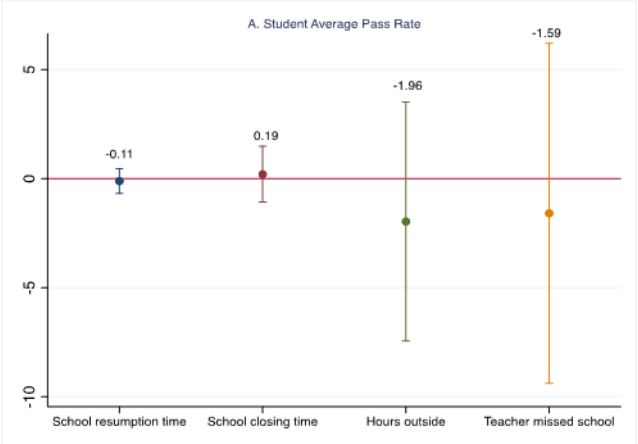


Figure 3a: Teacher attendance and student academic/mental outcomes—Student average pass rate

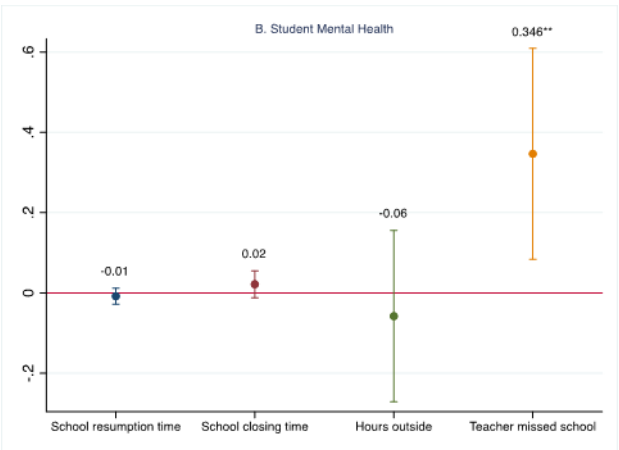


Figure 4b: Teacher attendance and student academic/mental outcomes—Proportion of pupils with any negative emotions

Note: The following covariates were included in the estimation: teachers' age, the number of years teaching in the school, overall teaching experience, education qualification (1 if university or post-university education), and class size. The school characteristics are the age of the school and the quality of available infrastructure, such as the number of buildings/classroom blocks that are in the school and the number of staffrooms for teachers in the school. The fixed effects are the geographical

location/LGA and interview date levels. We clustered the standard error at the school level.

Evidence from Interviews

Alongside a quantitative estimate of the determinant of teachers' attendance and the correlation between teachers' attendance and student outcomes, the study used qualitative data to provide contextual information and triangulation for the quantitative data, and to capture perceptions and explore factors that are not easily quantifiable. Although the focus of this qualitative data is to understand stakeholders' perceptions about the condition of attendance in rural schools and the viability of deploying a digital attendance system in rural schools in Osun state within the political economy context, our approach is designed to be flexible in order to respond to any unexpected areas of impact discovered.

To understand both the broad contextual issues and to gather data on the overall optics of rural teachers' attendance and current and potential policies to introduce a biometric system to enhance attendance monitoring, qualitative information was collected across a range of interrelated areas and grouped under five key research areas, as described in the following sections.

Perception Regarding Rural Teachers' Attendance and Potential Public Policies

The interview data provide insights into policymakers' perceptions of attendance in rural Osun State. This provides information on non-quantifiable dimensions of attendance from the policymakers' perspective, which is hard to measure quantitatively, but which is essential for buy-in and support for the potential deployment of digital technologies for attendance. The interview data show a consensus in opinions regarding teachers' attendance in this context. Among the stakeholders interviewed, the perception is that there is a poor attendance attitude exhibited by teachers posted to rural locations. Such attitudes are exacerbated by the remoteness of schools, making school attendance expensive, low monitoring of attendance from the central regulatory office, and inadequate teacher personnel to ensure adequate within-school internal control to check the activities of other teachers.

There has not been a very good performance in terms of attendance because of the fact that the schools are very remote and we don't have enough logistics to monitor the attendance of the teachers. (SUBEB Chief Executive Officer)

It is nothing to write home about ... It is nearly impossible to get 100 per cent attendance from rural teachers. (SUBEB Acting Secretary)

These sentiments reinforce the findings of the quantitative analysis. For example, recall that on average, 28 per cent of the teachers in the sample has missed school at least once in the last academic term, higher than the 15 per cent absenteeism rate for the West and Central African region in 2022 (Jativa et al. 2022). In summary, teachers' poor attitude

515 towards school attendance may be ubiquitous and widespread in this study's context, as
516 one stakeholder noted:

517 Yes, teachers are absent ... and they tell their colleagues to sign in for them. (Head of
518 Section, SUPEB)

519 *Perception of the Viability of the Deployment of Attendance Capturing Technology*

520 It is expected that teachers' school and class attendance can be improved with better
521 monitoring by the school and regulatory authorities. The education regulators even
522 acknowledge the fact that rural schools experience poor teacher attendance because of
523 the extent of monitoring, which is usually lax. As one stakeholder noted:

524 There has been very poor attendance in terms of teacher attendance because of the fact
525 that the schools are very remote and we don't have enough logistics to monitor the
526 attendance of the teachers. (Chief Executive Officer, School Services)

527 Some of the interviewees noted that the requirement for improved attendance
528 monitoring in rural schools will be expensive for policymakers to implement. One noted
529 that to monitor teachers in rural schools, there is a need to purchase automobiles for
530 school inspectors. For example,

531 Well, if the government can provide us with a Hilux vehicle, it will help our movement
532 within the rural areas as a team. (School Inspector)

533 Another noted:

534 Provision of logistics facilities ... that can help the monitoring, whether vehicles or
535 motorbikes, because there are some areas that are very difficult to visit in rural areas.
536 (School Inspector)

537 Therefore, the proposition of an electronic attendance system enhances monitoring by
538 circumventing the logistical challenges and manpower requirements associated with
539 manual monitoring. The stakeholders agreed with this stance, noting that the
540 implementation of this attendance system will be relevant for signalling to the teachers
541 the seriousness of school attendance. For example, one of the stakeholders noted:

542 The advantage of this system is that it will help teachers to be punctual at their duties.
543 And also, the rate at which teachers are absent from school will be reduced because they
544 will be guided to be up and doing because of this innovation. (Chief Executive Officer,
545 School Services)

546 *Potential Backlash from the Implementation of an Attendance Capturing System*

547 Backlash from school head teachers and teachers towards the use of a digital attendance
548 system in rural schools may be an essential drawback to the implementation of this
549 innovation. In our discussions with key stakeholders, including the head teachers of

each school, we noted that there was a consciousness of the potential backlash from teachers and head teachers in response to the introduction of technologies to capture attendance. Such a backlash may arise for a variety of reasons, as clarified in the interviews. For example, the deputy director for school services noted that complacency with the old attendance system may cause teachers to be reluctant to adopt the new system.

We are all human beings and change is a very hard thing. People find it difficult to move from an old system. ... There is a tendency for resistance, because it is a new development that they are not used to.

Nonetheless, most of the stakeholders were of the opinion that the potential backlash may not be an issue for the implementation of a new system because the school teachers in this study's context are trained to comply with central regulations. Therefore, once the new directives about the attendance system come from the central regulatory authority that governs education service delivery, compliance will be achieved. This conclusion is supported by the comments below:

Once the government is involved, there will be no problem with compliance. (SUPEB Officer)

If it is mandated by the government, the teachers will comply. (Head of Section, School Services, Ede LGA)

They will comply with the government if it is a government policy. (Head of Section, School Services, Atakumosa West LGA)

The stakeholders also noted that there should be enforcement by school inspectors to ensure robust compliance with the new attendance system. That is, once the new system is introduced, school inspectors needs to be tasked with the responsibility of enforcing compliance at the school level. An acting education secretary in one of the LGAs noted:

Definitely they will comply. They have no choice. It also depends on the inspectors enforcing compliance with the new system.

In addition, to ensure compliance, teacher training must be ensured before the implementation of the new system. This approach is urgent to improve affected teachers' skillsets towards the use of the new system and to ensure that compliance is achieved because of improved teachers' proficiency with this new system. Some of the stakeholders' opinions corroborate this conclusion, including:

Teachers cannot resist, since they've been given training already. (Head of Section, School Services Ayedaade LGA)

Once the teachers know how to use the new system, they will comply. (Acting Education Secretary, Ede North LGA)

Discussion and Conclusions

Discussion

The introduction of technology to improve the capturing of teachers' attendance in rural schools in Nigeria may be an impactful step to improve the education system in the context of low state capacity to monitor teachers and inadequate resources to motivate teachers to work. The data from this survey illustrate the need to enhance teacher attendance in this context, demonstrating the potential efficacy of improved monitoring of teachers, as seen from the quantitative and qualitative data. The improvement of teacher attendance is key to improving students' academic and non-academic outcomes, including their mental health outcomes.

The study's results suggest an association between teacher monitoring and indicators of school attendance monitoring. This is consistent with the tenets of the TPB and the theory of school-based accountability with regard to better student performance when working structures that can influence teachers' behaviour are implemented. This finding corroborates other studies that investigated diverse monitoring techniques in the health and education sector of developing countries, including the combination of attendance record keeping and disciplinary actions (Banerjee and Duflo 2006; Banerjee et al. 2008). Duflo et al. (2012) found that the application of technology, where cameras were used alongside other measures, was effective in reducing teacher absenteeism in India. Our study, alongside these other studies, argues for the application of technology for improved teacher attendance in the context of developing countries.

Our findings lend credence to the thoughts of school-based accountability given the association between teacher attendance and pupils' academic and non-academic outcomes. From a policy perspective, our findings align with the conclusion of the Department of Education that refers to teacher absenteeism as a "leading indicator" of student achievement (Miller 2012). Likewise, Miller et al. (2008) suggests that 10 additional days of teacher absence reduced the mathematics achievement of fourth-grade students by 3.2 per cent of a standard deviation. Our findings show a similar decline in student mental health as a result of teacher absenteeism. Therefore, improving the mental health of children in a context of inadequate facilities to address rising mental health issues should be one motivation for policies that address teachers' class absenteeism in this context

The interview data informed the discussion of diverse non-numeric issues relevant to the political economy issues regarding the implementation of a digitised attendance system and other matters for consideration in scaling up. Although the introduction of digital attendance systems might disrupt teachers' teaching and schooling norms, our investigation found that this might not be a problem of concern in this context. Although the school management system is decentralised, the rules governing school operations are centrally determined by the Ministry of Education. The central education authority decides on the attendance policies for schools and classes and teachers are required to

abide by this system once the regulators deploy the digital attendance system. Therefore, the likelihood of backlash will be greatly reduced with improved regulation and enforcement by the regulators.

Conclusion

This exercise was critical in gaining insights into the potential of deploying digital attendance systems by education regulators in Osun State, Nigeria, to improve teachers' school and class attendance as well as pupils' human capital formation. The proposed innovation regarding attendance monitoring is necessary because of the shortcomings of the manual attendance system currently used by schools in this region. Evidence from our field survey and other anecdotes suggest that the manual attendance system is ineffective in enhancing teacher school attendance because it is prone to manipulation, fraud, inaccuracies, and slow monitoring by regulators.

Major data sources that were explored for this exercise included school administration records from education regulators in Osun State and their representatives, information on teacher and pupil records obtained from the school, and quantitative and qualitative surveys conducted with schools' head teachers, class teachers, and other education stakeholder in Osun State. At a time when the government is rationalising the use of public funds for improved educational gains, including expenditure on school infrastructure, consideration of education grants, and monetary and non-monetary incentives to motivate teacher and pupil class attendance, the urgency of considering a low-cost, technology-driven approach to achieve better teacher attendance, with potential for budgetary savings in the long run, cannot be overemphasised. This sentiment emanates from our fieldwork. Overall, the introduction of this new attendance innovation is relevant practically and policy-wise, as it has the potential to address the inefficiencies of the manual attendance system and promises important educational gains from improving teacher attendance and the educational outcomes of pupils.

The study is limited in that it does not provide evidence regarding the cost-effectiveness of deploying technological structures for monitoring teachers' accountability. Besides, it does not account for other motivational factors that can aid teaching delivery vis-à-vis digitised monitoring system for effective outcomes on the performance of the pupils.

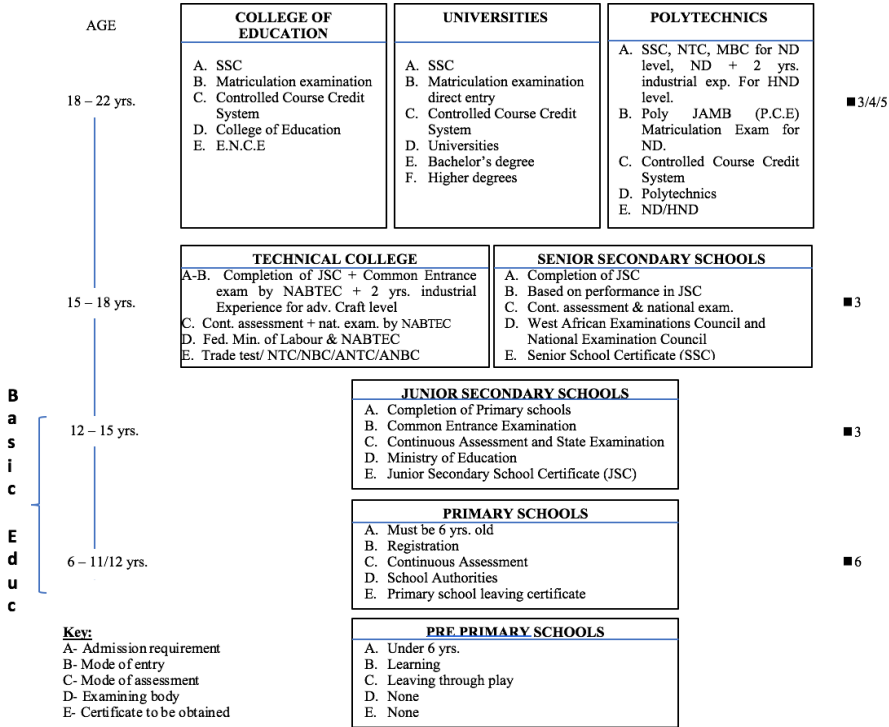
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756 Appendix 1



757

758 **Figure A1:** Education System in Nigeria. Source: Authors' computation, adapted from
759 UNESCO (2006)

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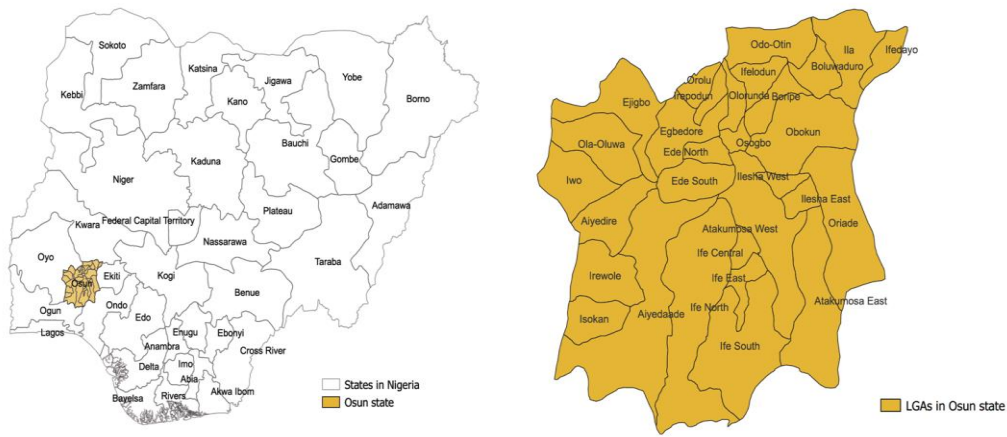


Figure A2: Map of Osun State and Nigeria

