

Final report

Missing links and mismatches

Data challenges with
policy implications

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Missing links and mismatches: Data challenges with policy implications

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Introduction

The original aim of this project was to evaluate the impact of a large salary increase for civil servants on their performance and the provision of public services. The primary focus was on the two largest public sectors, education and health. The setting for this study was a major civil service salary reform in Zambia in September 2013. Salaries were increased across the board, but the extent of the increase varied substantially across civil servants. Due to a myriad of data-related obstacles, it has not been possible to achieve the original goal of this study. While the effect of the salary reform on civil servant salaries was documented in detail, it was not feasible to link salary changes to changes individual performance and public service provision.

Nevertheless, the findings of this project provide several important lessons. These derive from the description and analysis of the encountered obstacles. While lack of data and imperfect data quality were recurrent issues, the major obstacle faced was the lack of integration of different administrative data sets. We hope that sharing these lessons will be helpful for policy makers and researchers in Zambia alike.

Finally, this project has raised important new research questions regarding the allocation of public services in developing countries. These questions have led to new IGC-funded projects looking at important and previously unknown facts about the spatial distribution of teachers and health services which we are currently investigating further.

We would like to thank all of our partners within GRZ who facilitated this work. Particularly, we would like to thank the Public Service Management Division (PSMD), specifically Ackim Sakala, Vivien Ndhlovu, Steve Chainama, Jervas Mwiinga, and all officers who pulled payroll data and provided important background information within the Payroll Management and Establishment Control (PMEC); Lufwendo Mangolwa, Chibesa Ndawa, within Technical Services Department (TS); the Ministry of Education (MoE), specifically Habakuku Mwale and Prince Ngulale within Human Resources, Billy Jere, Bupe Musonda, Lancelot Mutale, and Stephen Zimba within Planning; Michael Chilala, Teza Nakazwe-Musakanya and Shakazo Myceze from the Examinations Council of Zambia; and the Ministry of Health (MoH), specifically Winza Mwauluka, Trust Mufune, Brivine Sikapande within the Monitoring and Evaluation Unit, Levison Nkhoma within the Information and Communication Technology Unit, and Benjamin Nsenje within Human Resources.

Background: Research Question and Salary Reform

As indicated above, the original research questions of this project regarded the impact of the 2013 salary reform: How did the 2013 salary reform for civil servants affect civil service productivity? Based on quantitative analysis of payroll and sector-specific outcome data, what was the causal effect of the reform on worker productivity in health and education? What were the underlying channels through which the reform affected performance?

The salary reform was announced by the Government of Zambia (GRZ) in March 2013 and became effective for all civil servants on September 1, 2013. The reform consisted of a re-grading exercise which grouped all positions into 18 grades based on experience and educational requirements. For each grade, a minimum wage was established, with the condition that employees with higher salaries than the minimum for their revised salary grade would continue to be paid these salaries.

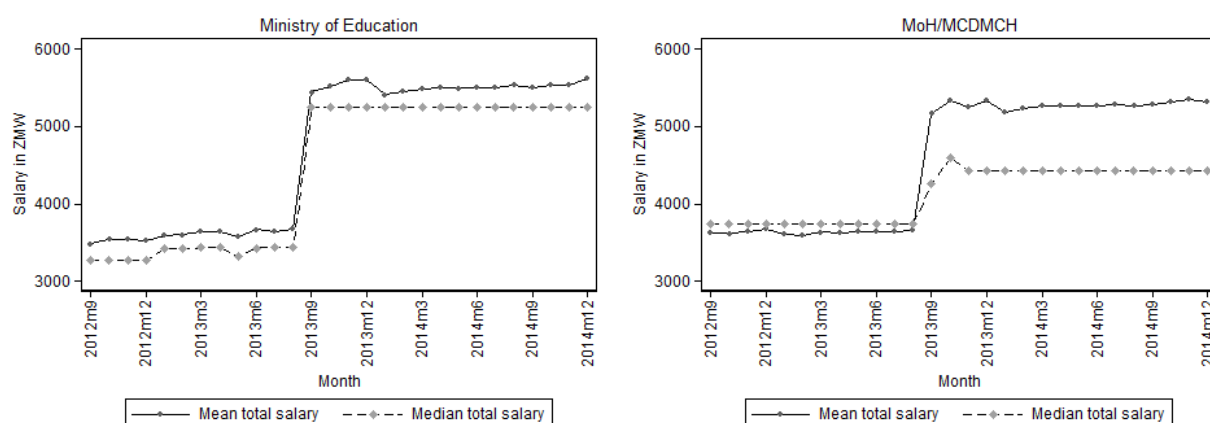


Figure 1: Average total salary (basic salary and allowances) over time

As a consequence of the reform, the median wage of civil servants in MoE increased from 3325 ZMW to 5250 ZMW. In the MoH and Ministry of Community Development and Mother and Child Health (MCDMCH) median pre-reform salaries were 3737 ZMW and rose to 4426 ZMW after the reform (see also figure 1). However, the amount of increase varied greatly (see figure 2) across positions and even across civil servants within the same position. More details on the effects of the reform on employee salaries are available in the final report for IGC 41305.

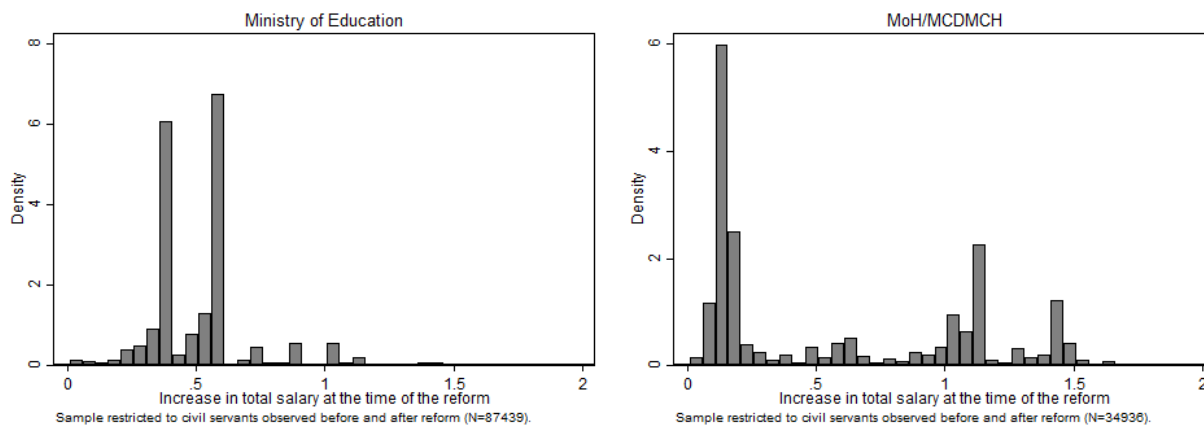


Figure 2: Distribution of the pay increase at the reform across civil servants

Obstacles to Analysis

In order to trace out the effect of the salary reform on civil servant productivity and the provision of public goods, we intended to link up government payroll data with individual performance records and administrative data on public service provision in the education and health sector. In this endeavor, we encountered three main challenges:

1. Individual performance data was scant. Hence, it was not possible to study effects of the reform on individual productivity and we focused on analyzing effects at the level of the organizational unit (school/health facility).
2. Linking payroll data with records of public service provision at the organizational unit level was inherently difficult because bridges between the different data sets hardly existed.
3. Payroll information on civil servants' organizational unit turned out to be largely misspecified. Thus, it was not possible to relate salary changes observed in the payroll to the performance of specific organizational units.

While the second obstacle was largely surmountable, the first ruled out an evaluation of the salary reform at the individual level, and the third ruled out an evaluation at the facility level.

Lack of Individual Performance Data

A main issue preventing the originally planned analysis from being carried out successfully was the lack of individual performance data. Both the health and educational sectors have some mechanisms for monitoring individual motivation and performance. Formally, there are annual performance reviews through the Annual Performance Appraisal System and evaluations by departments such as MoE Standards and Evaluations. Other potential metrics of effort include attendance, commendations, and reprimands. Unfortunately, the vast majority of individual-level data is

exclusively paper-based without a straightforward way to digitize it. Additionally, the decentralized nature of these records makes them extremely difficult to tie into a nation-wide study. Most records are maintained at district offices or organizational units (schools for education, health posts for health), with varying qualities of data storage. It is also unclear how regularly these evaluations are performed. Anecdotally, teacher evaluations are often not performed each year, and Standards and Evaluation school visits face significant budget constraints.

After an exhaustive search for potential performance measures in the MoE and MoH, we came to the conclusion that we were not able to assess the effect of the salary changes on individual motivation and effort due to the lack of data that can be used for an analysis of this nature.

Missing Links

In the absence of individual-level performance data, an analysis at the organizational level remained the only option. For this purpose, organizational units (schools and health facilities) in the payroll system had to be linked to administrative data on public service provision in the education and health sector.

The relevant data sets in the education sector were the Education Information Management System (EMIS) data and national exam test score data from the Examinations Council of Zambia (ECZ). Unfortunately, school identifiers differ across payroll and these two data sets. While a partial bridge between ECZ identifiers and EMIS identifiers exists, there is no bridge at all between payroll and EMIS or ECZ. Therefore, matching could only be based on school and district names. The subsequent string matching exercise was complicated by a variety of issues:

- Different spellings of school and district names within and across data sets.
- Lack of a master list of government schools: the EMIS should in principle contain the universe of government schools, however return rates for the annual school census which feeds the EMIS are not 100%, and indeed we identified 645 schools in the payroll system in 2014 that were not listed in EMIS.
- Incorrect associations between schools and districts in the payroll system: some employees were listed with a given school in a certain district, but the school was actually located in another district. To our understanding, this problem arises when teacher transfers are recorded in the payroll system and the district field is not updated.
- Creation of many new districts in recent years: new districts were created by presidential decree, but the precise timing of the de facto establishment of these districts is often unclear and so are their borders. Therefore, it was not straightforward to construct a district panel.

Despite these issues, we managed to match 88% of schools in payroll to EMIS, and 79% of schools in payroll to both EMIS and ECZ.

However, an additional challenge arose from the fact that students do not necessarily take their final exams at the school they studied at. The school recorded in ECZ data is the one where a student took their exam. However, not all schools are also registered test centres, and a number of students sit for exams at a different school from the one they attend. Because there is no clear way to definitively tie a student to where they are enrolled, we not only face the inability to evaluate all schools, but also risk attributing the performance of a school to students who did not actually learn there.

While there is reliable data on which schools are test centres, tracking of which non-test centre schools send their students to which test centres is not maintained in a standardised or centralised way. It is therefore difficult to evaluate how large of an issue this is, though according to a survey of rural government schools, 63% of test centres receive students from other government schools.

In the health sector, the relevant data set to merge with the MoH payroll data was the Health Management Information System (HMIS) data. But the merge of MoH payroll and HMIS data was never attempted because an additional problem emerged and made an evaluation of the salary reform infeasible: payroll mismatch.

Payroll Mismatch

Payroll mismatch refers to the fact that civil servants do not work at the organizational unit they are listed at in the payroll system. A comparison of the number of teachers listed in the payroll system and the EMIS for all schools for which these two data sets could be merged shows substantial differences between the number of teachers listed in the payroll system and the number of teachers reported by the head teacher. Figure 3 illustrates these differences. On average, there are more teachers on payroll than in EMIS. However, there is a great deal of variation across schools, with some schools having far more teachers on payroll than in EMIS (above the 45-degree line), and others having much fewer (below the 45-degree line). This analysis could actually understate the magnitude of payroll mismatch, as even when schools have identical counts of teachers in the two data sources, there is no guarantee that these are the same teachers.

Understanding the extent and nature of payroll mismatch is of high policy interest. The issue has large implications on human resource planning, as it prevents GRZ from planning deployments based on actual vacancies. Furthermore, it leads to payment irregularities because staff that are listed on the payroll of a rural facility receive a rural or remote hardship allowance even if they actually work at an urban facility. The issue was therefore studied extensively in collaboration with government partners.

Payroll mismatch is caused by a variety of factors. Anecdotally, one major factor is unauthorised transfers from undesirable rural facilities to those closer to town centres where employees prefer to work, even when the facility has no open paypoints. Because the employee being transferred cannot be moved on the payroll system, they officially stay at the first facility, and a replacement cannot be deployed. Another cause is lack of updates to the payroll system both at an individual and facility

level. New facilities are often only given a formal establishment (“gazetted”) with substantial delay, so district staff must use paypoints from other facilities to ensure that they can be staffed. Establishments of existing facilities are rarely updated even when facilities have grown significantly.

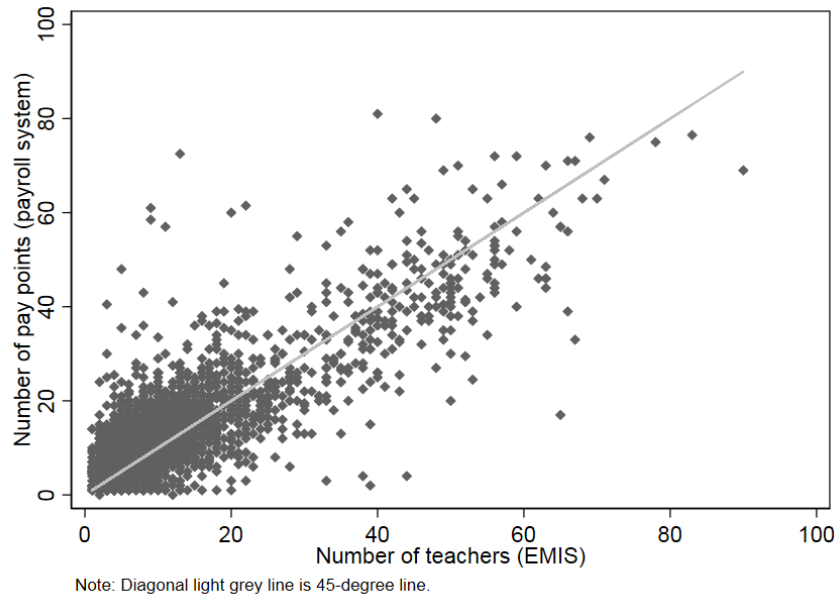


Figure 3: Paypoints and actual number of teachers across schools in 2014

Because payroll mismatch is a high policy priority to MoE, it had begun to investigate the issue with the help of the Zambia Education Sector Support Technical Assistance Facility (ZESSTA). Since our research is complementary to theirs, we collaborated with the Ministry of Education and ZESSTA on the design of staff return templates that indicated teacher working and payroll locations. Results from these staff returns have been received from Copperbelt and Northwestern provinces. This data shows significant variation in payroll mismatch by district, ranging from 43% to 77% of staff not working in the facility where they are paid.

The staff return data is particularly useful because it not only allows for analysis of the magnitude of payroll mismatch, but also its causes. A close analysis of staff returns from one district indicates that 17% of payroll mismatch comes from staff working at a school with open paypoints who could be added to that school’s payroll. Additionally, 22% of mismatch results are due to staff working in ungazetted schools. A further 33% of mismatch occurs when staff are paid from an understaffed school and work at one with higher staffing levels, suggesting the occurrence of unauthorised transfers.

Additionally, a 2016 survey of 158 rural schools across 7 provinces led by the researchers for a different project conducted by the researchers indicated that 40% of teachers are paid from a different school than the one where they are working.

These analyses corroborate a 2014 Office of the Auditor General (OAG) report, which found that up to 60% of teachers do not work at the location where they are paid.

While we are as yet unable to quantify the extent of payroll mismatch in the health sector, anecdotal evidence from the Ministry of Health suggests that it is also a major issue in the health sector.

Policy Recommendations

While the above issues prevented a comprehensive impact analysis of the 2013 salary reform, they nevertheless allow us to formulate a number of recommendations for policymakers:

1. Integrate administrative databases

All databases involved in this project, and most Zambian administrative databases in general, exist independently of each other and common facility identifiers across databases do not exist. The integration of the different databases or at least the introduction of common identifiers would be of great value to both researchers and policymakers. It would allow to cross-check information across databases instantaneously and to flag inconsistencies. Thus, potential problems would be highlighted quickly and overall data quality would be improved significantly. The issue of payroll mismatch provides a great example of the power of database integration. In EMIS head teachers report the identities of all teachers working at their schools every year. If EMIS and MoE payroll were integrated systems, any mismatch between the two systems would immediately raise a flag and could be investigated subsequently. This way payroll mismatch could be monitored and prevented as it emerges. Moreover, even in the face of substantial payroll mismatch, it would have been possible to evaluate the effects of the salary reform at the school level. This is because reform-induced salary changes of a given teacher as recorded in the payroll system could have been linked to the performance of the students at the school the teacher works at.

2. Conduct regular updates of establishments

Outdated facility establishments are a major barrier to the efficient management of teacher and health worker recruitment, deployment, transfers and payment. Regularly updating all establishments based on local needs seems key. This includes timely gazetting of newly built facilities.

3. Enforce transfer and deployment policies

Unauthorized transfers of staff are an underlying cause of payroll mismatch. By enforcing the formal transfer and deployment policies this source of mismatch could be eliminated. For example, transfers of teachers to schools without vacant paypoints should be inhibited.

4. Update payroll system after transfers

Simple lack of updating payroll after regular authorized transfers is also a quantitatively significant problem that should be addressed. Payroll mismatch would be decreased substantially if the payroll system would always be updated correctly after transfers.

5. Regularly evaluate and document individual performance

Regular performance evaluations including universal standardized documentation thereof would allow policymakers to differentiate strong from weak performers, to promote the former and offer support to the latter.

6. Track school of origin in national exam data

Recording the school at which a student studied at the time of the national exam would allow for an accurate assessment of the performance of the students from each school. Such information would be highly valuable for policymakers and researchers alike.

7. Improve documentation of new district creation

Districts are created by presidential decree and the civil servants who are responsible with developing administrative structures within the newly created districts are usually given very little notice. Additionally, while GRZ staff are knowledgeable about characteristics of new districts such as whether offices have been built in the capital, there is scant systematic documentation. An improved tracking system of when districts were created, what facilities belong under the jurisdiction of the new district, and infrastructure development in the new district capital would assist both policymakers and researchers.

Follow-Up Research

Our work on this project has not only led to the above recommendations, but it has also raised new research questions. Analysis of EMIS and payroll data revealed that while there are substantially different teacher counts in the two data sets, pupil-teacher ratios indicated by both sources vary widely across schools. This motivated both global and Zambia-specific research on the allocation of teachers across schools and state capacity which is currently being carried out as a separate IGC-funded project (89454). The new project describes and compares the within-country distribution of teachers across public primary schools in a large number of countries. Based on the descriptive evidence, it then aims to understand why pupil-teacher ratios vary across schools within countries and how much countries could improve educational outcomes by improving teacher allocation.

The collaboration with MoH for this project also led to a new project tackling some of the issues raised above (IGC 41425). The objective of this project is to merge all the available national administrative data sets in the Zambian health sector in order to provide spatial mapping of the supply of health services at the micro-level. The resulting database shall provide a tool to assess the efficiency of the allocation resources and enable evidence-based policy making at MoH.

Conclusion

While the work under this project did not lead to a comprehensive impact analysis of the 2013 salary reform, there is still substantial value in the work done through the project. As discussed in the final report of IGC 41305, it has provided insight on the nature and effects of the salary reform, though not as comprehensively as originally planned. Additionally, the work has documented a number of administrative problems and proposed pathways to address these. At the same time, the uncovering of these problems has spurred further research on resource allocation and management in the public sector of developing countries which has been met with great interest by both policymakers (UNICEF, World Bank, Ministries of Education in Guinea-Bissau, Mozambique, and Zambia) and researchers.

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