



CREATIVE

Livros a Tempo Program Final Report: Learning Note

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Introduction

This report provides a summary of the learnings from implementing the Livros a Tempo (Books on Time) project in remote districts and schools in Nampula and Zambezia provinces in Northern Mozambique. The insights are a synthesis of various stages of the project ranging from the contextual study, the RBF (Results Based Financing) co-design and implementation, and the final study.

According to the 2017 Mozambique Population and Housing Census, Nampula has a population of 5,758,920, making it the most populous province in the country and it is divided into 18 districts. Zambezia is the second most populous province in Mozambique with a population of 5,043,120 and is divided into 16 districts. Roughly 15 million books are imported each year in Mozambique for provision to public schools with Nampula and Zambezia receiving 7 million of those books. Yet, in both provinces, infrastructure for book delivery is lacking, resulting in delays, especially for remote districts.

The Livros a Tempo project focused on improving the public provision of books for early grades from the district-level downward, specifically looking at Portuguese and Mathematics textbooks. All data is based on study and implementation in Nampula and Zambezia. Statements and inferences are with respect to that context, and remote ZIPs (school clusters called “Zones of Pedagogical Influence” with a leader school) and schools within them. Working in consultation with the provincial governments, Livros a Tempo selected six districts in each province to implement the program. The provincial governments requested that Livros a Tempo focus on the most difficult to reach districts and the most remote ZIPs and follower schools in those districts. This decision was made to maximize the value of the findings to understand and improve the book delivery process in underserved schools. The districts in Nampula were: Liupo, Mogincual, Larde, Angoche, and Nacala-Porto. In Zambezia, the districts were: Pebane, Inhassunge, Luabo, Morrumbala, Milange, and Ile.

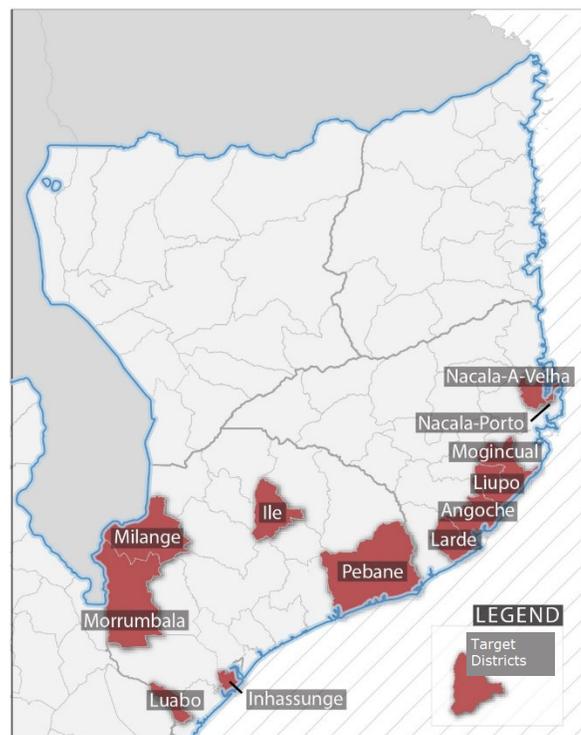


Figure 1: Map of Livros a Tempo Target Districts

Livros a Tempo began in early 2019 by conducting a contextual study of the book delivery supply chain in these twelve target districts in Nampula and Zambezia. For the contextual study, Livros a Tempo collected a total of 160 surveys at districts, ZIPs, and follower schools.

Using findings from the study to inform the planning, Livros a Tempo held a co-design event in Nampula in August 2019. The event engaged district directors and book technicians from all target districts to design a Results Based Financing (RBF) intervention to improve the availability of books from districts to public schools. During the co-design process, multiple solutions to book delivery delays and challenges were discussed. The top solution that emerged from this process was using RBF to incentivize

construction or repair of book storage at the ZIP level to address a key bottleneck in the book delivery supply chain. Previously, districts were not been able to deliver books before the rainy season due to a lack of waterproof book storage, meaning books were arriving after the beginning of the school year.

Livros a Tempo then implemented the RBF program by developing a set of rules for a competition that outlined the requirements to win ten ZIP awards and three district awards in each province. In each district, only the 10 furthest ZIPs from the district office were qualified to compete, totaling 114 qualified ZIPs across all districts (some districts had less than 10 ZIPs). In Nampula, each target district contains 9 to 23 ZIPs and qualified ZIPs were located on average 38 kilometers away from the district, with some as far as 132 kilometers away. In Zambezia, each target district has 16 to 63 ZIPs and qualified ZIPs were located on average 88 kilometers away, with some as far as 181 kilometers away.

Livros a Tempo conducted a series of socialization and training sessions with ZIP coordinators and district directors to share the RBF rules and gain insights on the approach. The rules required ZIPs to construct new storage or repair storage by November 15, 2019; storage structures had to be waterproof and be large enough to hold all books delivered by the district; and books had to be delivered to all follower schools by February 29, 2020. ZIPs were asked to submit before and after timestamped photos of repaired or newly constructed book storage to the project and submit receipts of book delivery. The first ten ZIPs to fulfill the RBF requirements and submit photos in each province won and were awarded 50,000 MZN (about 700 USD) to the ZIP Coordinators. Requirements for districts included informing ZIPs of the award rules and collecting photos of book storage unit construction or repair. To win, districts had to ensure books were delivered to ZIPs before the 2020 school year began and at least one ZIP in the district had to win the ZIP competition. Three districts in each province that fulfilled the requirements were awarded 1st (60,000 MZN), 2nd (50,000 MZN) and 3rd (40,000 MZN) place awards to district directors in order of the districts with the most number of ZIPs that were successful in winning the ZIP competition.

In early 2020, following book storage construction and book distribution, Livros a Tempo conducted a final study of the RBF incentive program and book delivery to schools in the project's target districts. In March 2020, the project trained enumerators to conduct four surveys: districts, ZIPs, follower schools, and students. Enumerators deployed to the field in April 2020, starting in Nampula. Data for Zambezia was then collected remotely due to restrictions related to the COVID-19 pandemic. During the final study, the project collected a total of 213 surveys at the three levels.

This note is broken down into three sections. This first section focuses on general learnings about book availability and distribution exposing opportunities and challenges, including some from the COVID-19 pandemic. The second section focuses on results from applying the designed RBF program, including return on investment. The third section focuses on reflections from implementing all phases of Livros a Tempo, that can provide operational and design pointers for future RBF implementation.

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1. Learnings about Book Availability and Distribution in Mozambique

On an annual basis, the Mozambique Ministry of Education and Human Development (MINEDHD) procures textbooks for free provision to primary public schools by launching a public bid whereby eligible publishers apply. After the selection process, the publisher that has been selected and approved is awarded the bid to publish textbooks and these are generally published offshore. After they have been published, books are delivered to MINEDHD who ensures that books are delivered to all provinces from ports of entry through DINAME (public logistics company) and other private logistics companies. Once books are in the provinces, these are delivered to districts by DINAME. Then the Education District Offices (SDEJT) with the support of the district government deliver books to schools and/or more likely to schools cluster leads (ZIPs) and the latter then delivers to the follower schools. On average, there are five schools per ZIP. It is MINEDHD's duty to ensure that textbooks are delivered up to the schools through the involvement of SDEJT, district governments, DINAME and other private logistics companies. While no legal guidelines or formal written policy on textbook distribution exist in Mozambique, based on information from the MINEDHD Book and Didactic Materials Department, it is the district office's (SDEJT) responsibility to deliver and distribute the books from district down to schools.

1.1. Book Availability to Students

- There is on average at least a book per student for early grades in Nampula and Zambezia
- BPP remained largely the same from 2019 to 2020 in Zambezia and increased in Nampula, which has better BPP than Zambezia, signaling more distribution challenges in Zambezia
- The Ministry only provides 40% of books for Grade 3 and up with schools reusing prior year books, but it appears schools are falling significantly short in collecting and reusing books

Based on book delivery receipts and enrollment data analyzed in the final study for 154 remote schools in Nampula and Zambezia, the book to student ratio or books per pupil (BPP) in 2020 for Grade 1 is roughly 1.35 in Nampula and 0.99 in Zambezia, and for Grade 2 is roughly 1.58 in Nampula and 0.97 in Zambezia. Nampula fares much better than Zambezia, which is consistent with findings from the project's 2019 contextual study that signaled more distribution challenges in Zambezia.

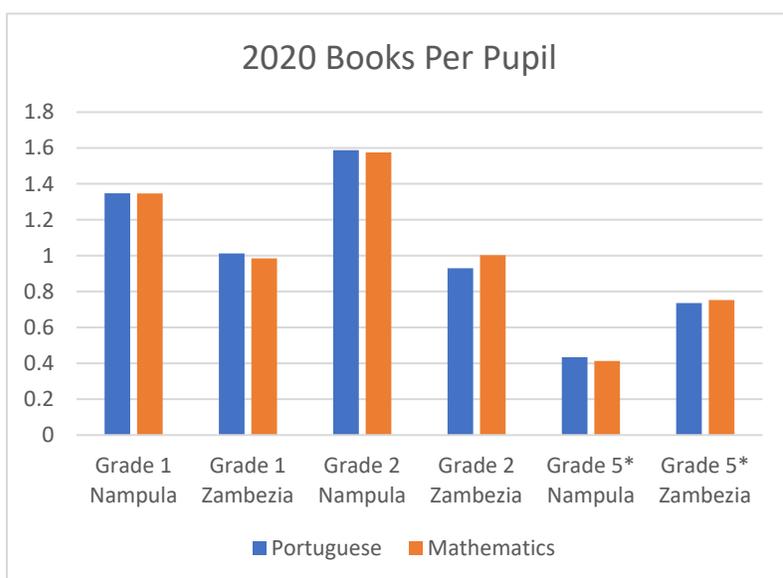


Figure 2: Books Per Pupil by grade and province. *New books per pupil

Broken out by subject, it appears that the book to student ratio is nearly the same for Portuguese and Mathematics books, as can be seen in Figure 2. A ratio of higher than 1 indicates that every student should have a book. We also calculated

the ratio for Grade 5 but note that this is not the real book to pupil ratio because the Ministry only provides 40% of the books for Grade 3 and up, with schools reusing prior year books. As such, the new books per pupil in Grade 5 are 0.42 in Nampula and 0.74 in Zambezia, both above the 0.4 Ministry target, with Zambezia faring better than Nampula.

There was not much difference in the book per pupil ratios between ZIP leader schools or follower schools. For the schools that have a book to student ratio under 1 in 2020, in Zambezia many of those schools were in Pebane and Milange. In Nampula, many of those schools were in Nacala-Velha and Liupo districts.

Compared to the 2019 book per pupil ratios, the 2020 book per pupil ratio is roughly the same in Zambezia and has increased in Nampula for Grade 1 by 22% and Grade 2 by 35%, as can be seen in Figure 3. Considering Nampula schools sampled were already on average above a ratio of 1 in 2019, this is an increase worthy of further exploration to explain the change.

For Zambezia, some of the schools with the lowest book per pupil ratio in 2019 were also the ones with the lowest ratios in 2020, such as the schools in Nagor ZIP in Milange and Mihecue ZIPs in Pebane with 0.17 average books per pupil in 2020 for Grade 1. In Nampula no clear pattern of the worst affected schools between 2019 and 2020 emerged in our sample. Identifying the handful of ZIPs and schools with consistently low books per pupil ratio, and targetting improvements for them is a recommendation for future programming.

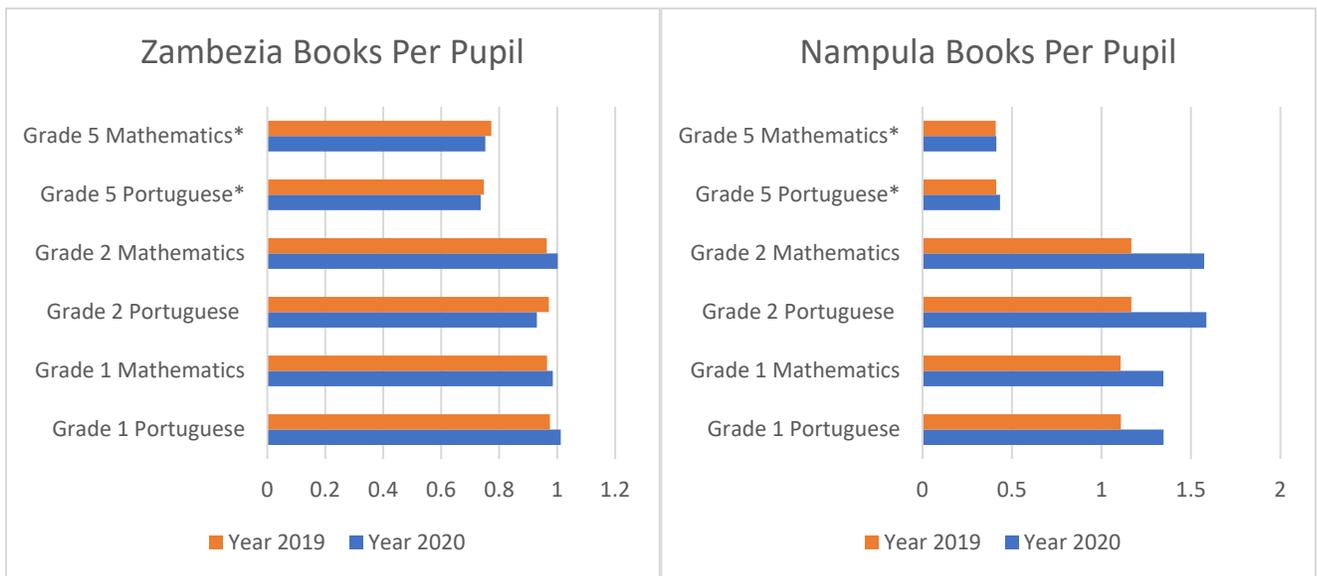


Figure 3: Books Per Pupil in 2019 vs 2020. *New books per pupil

In March 2020, enumerators visited 54 classrooms at ZIP and follower schools in Nampula and observed a book to student ratio of 0.97 for Grade 2 and 0.65 for Grade 5 by counting number of students present and the number that had books. There was not a significant difference between Portuguese and Mathematics books. Comparing this to the book per pupil ratio in Nampula (calculated using enrollment and delivery receipts, see Figure 1), an observed ratio of 0.97 for Grade 2 upholds that there is nearly a book per child in the sampled remote schools in Nampula. A ratio of more than 1 could not have been

observed and the slightly lower than 1 ratio can perhaps be attributed to some students forgetting to bring their book to class.

However, it is enlightening to see that the observed ratio for Grade 5 books is 0.65. Compared to Figure 2, which shows that in Nampula the Ministry supplied 42% of Grade 5 books, it looks like the schools are falling significantly short in collecting and reusing books from prior years. This can be attributed to wear and tear, perhaps insufficient books to begin with, or other reasons. This is an area for potential programming such as increasing book printing for Grades 3 up, measures to keep books in better condition in homes and schools, and incentives to return them at the end of the school year.

We also observed book sharing in the classroom visits to the schools in Nampula. While the sample was small, 85% of Grade 5 students reported that they share books this year, as opposed to 37% of Grade 2 students, further indicating there is likely a shortage of books for Grade 3 and up. 93% of students reported they received their books in new condition. Also, 94% reported they received Portuguese books, but only 70% reported receiving a Mathematics textbook. In Nampula, 92% of Grade 5 students reported returning their prior grade books at the end of the last school year. Given the small sample (student surveys at schools were hampered by schools closing due to the pandemic), that this answer was based on recall, and that students may fear answering honestly, it is inconclusive whether students are sufficiently returning books at the end of the school year.

We were glad to find from the students that 100% of them regularly take books home, which tallies with responses from school principals and ZIP coordinators across every district in both provinces. This is worth noting, particularly as schools are closed in response to COVID-19.

1.2. Book Delivery Timing

- Books arrived at most ZIPs in February for the 2020 school year, slightly later than prior year
- Books arrived at most schools between December 2019 and February 2020

Using book delivery receipts at ZIPs and schools, we calculated that books reached most schools in both provinces between December 2019 and February 2020 for the 2020 school year. For the 2019 school year, the books reached most schools between January and February 2019. The contextual study in 2019 showed that 44.44% of schools believe that books do not arrive at ZIPs on time because of delays upstream from districts and 23.81% believe it is because of weather. Districts got the books later this year, with the median getting them in February as opposed to normally in December based on recall. In turn, ZIPs got them a month later than last year. Yet schools got them at the same time or earlier, suggesting potentially shortened time between ZIPs and schools. A more nuanced analysis of book delivery dates and times can be found in section 2.2.2. Figure 4 shows when Grade 1 Portuguese books arrived at ZIPs and schools in Nampula and Zambezia for the 2020 and 2019 school years based on book delivery receipts.

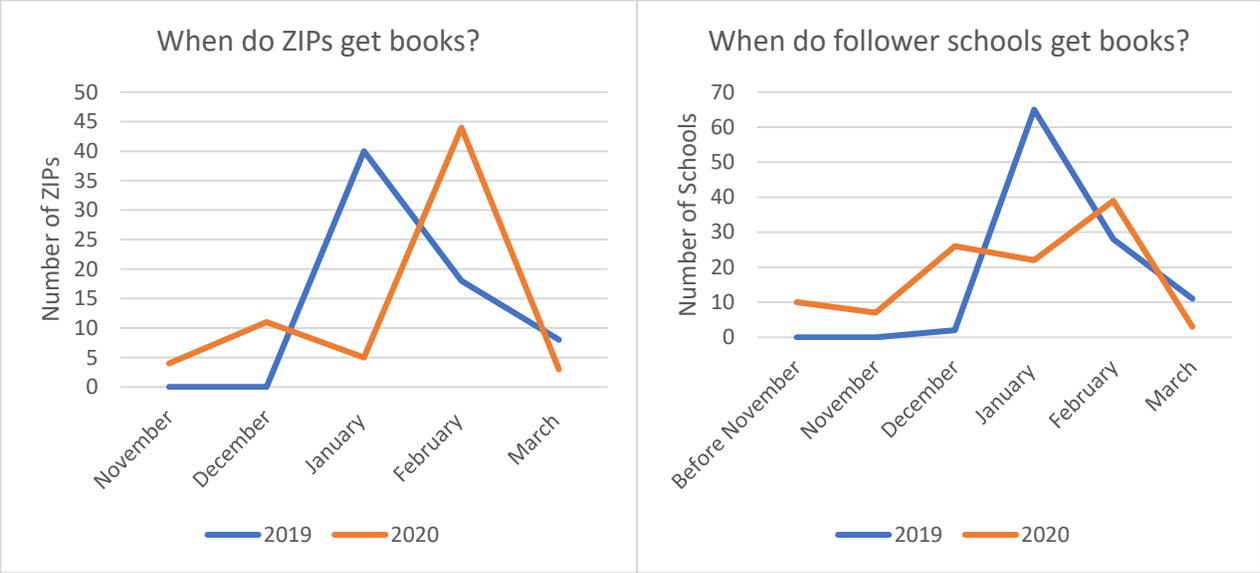


Figure 4: Book delivery timing at ZIPs (left) and schools (right) in 2020 vs. 2019

The average cost of book distribution for district to ZIPs in 2019 was 88,612 Meticaís (USD 1,236), with it taking 10.5 days to distribute books to all ZIPs, and for 2020 it was 130,500 Meticaís (USD 1,820) and taking an average of 9 days based on memory/recall by districts directors and book delivery technicians.

1.3. Book Distribution Challenges and Opportunities

- A lack of clear guidelines, communication procedures, regular inventory and budget for book delivery contribute to delays book delivery downstream from districts
- Waterproof book storage is often insufficient at the ZIP level, and low at schools, meaning books cannot be delivered prior to the rainy season, thus causing delays
- Transportation poses a key challenge in the book delivery supply chain, with ZIPs sometimes and schools often tasking students to pick up books

1.3.1. Policies and Capacity Building

Book delivery from districts to schools is generally based on vague guidelines rather than official policies in Mozambique. Many stakeholders in the book delivery chain are not clear on the precise responsibilities of each entity in the book delivery chain. For example, the district director and book distribution technician from the district of Morrumbala voiced that book delivery would be improved if MINEDH (Ministry of Education and Human Development) set a specific timeline for book delivery.

Across all districts, district directors reported that staff lack an understanding of book distribution logistics and cannot meet the demand of the book distribution supply chain. Some pointed to poor management, unqualified staff, and insufficient staff. There is an opportunity for the Ministry to produce a book distribution manual spelling out book delivery procedures, timelines, roles, and policies

and to disseminate them, building the capacity of district technicians, ZIPs coordinators and school managers.

1.3.2. Financing

MINEDH believes that all the districts have book delivery budgets, but the districts report that they do not. Fifty-five percent of the districts in Nampula and 20% of the districts in Zambezia have budget for book delivery. Some districts believe that book delivery budgets have been eliminated in the past 5 years. There is rarely a separate formal line item in the budget for book delivery. Also, the budgeting system does not allow districts to budget for book delivery explicitly.

Further, these budgets are insufficient and quite likely to be depleted by the time of book delivery, as can be seen in Figure 5. The district then often cannot afford to pay per diems of book delivery technicians, the most important personnel for book distribution from districts down, leading to no logistical supervision. Lack of budget manifests in difficulty in organizing transportation (see next section), holding books from multiple shipments to reduce transportation costs hence delaying book delivery downstream, not providing ZIPs with resources and so on. For example, only 3.95% of ZIPs report having been provided a budget for book warehouses or storage.

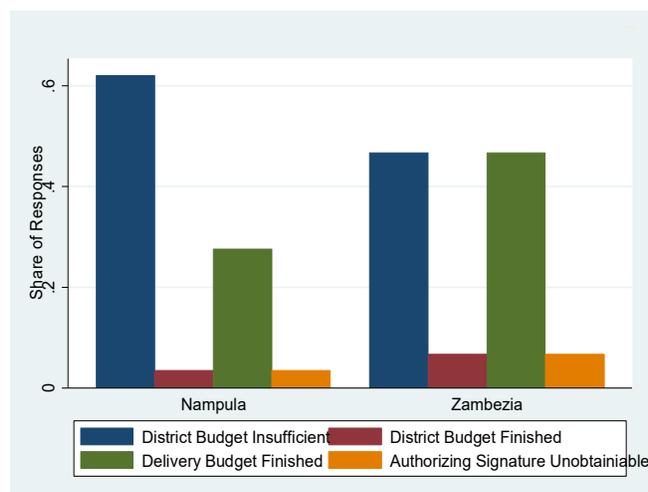


Figure 5: Reasons for Lack of Funds at District Level

There is a need to increase funding and allocate dedicated budget for districts to ensure on-time book delivery that must be retained until time for book delivery and be managed transparently. There is also an opportunity for this funding to be results-based.

1.3.3. Transportation

Distribution of books from districts down to schools is the responsibility of the district education offices. The district offices are supposed to deliver books to schools or school clusters (ZIPs), and the ZIPs then are supposed to deliver to the follower schools. However, this is not necessarily how the delivery manifests, as can be seen from Figure 5 where in Zambezia for instance, 60% of the ZIPs themselves pick up the books from districts. Often, the books are collected by mobilizing students to fetch them and these trips take 9 hours on average, sometimes over multiple days. Further down the chain, schools are mostly picking up the books from ZIPs instead of ZIPs bringing books to them, again often using students. These trips to pick up books from ZIPs happen multiple times a year with a little over 4 shipments in Nampula and 8.5 shipments in Zambezia. It is not surprising that ZIPs and schools prefer that books arrive in lesser number of shipments. Sometimes, the schools are notified when books will

arrive at ZIPs, and they come to pick up the books the same day they arrive at the ZIP. This practice may have developed since many ZIPs did not have sufficient book storage.

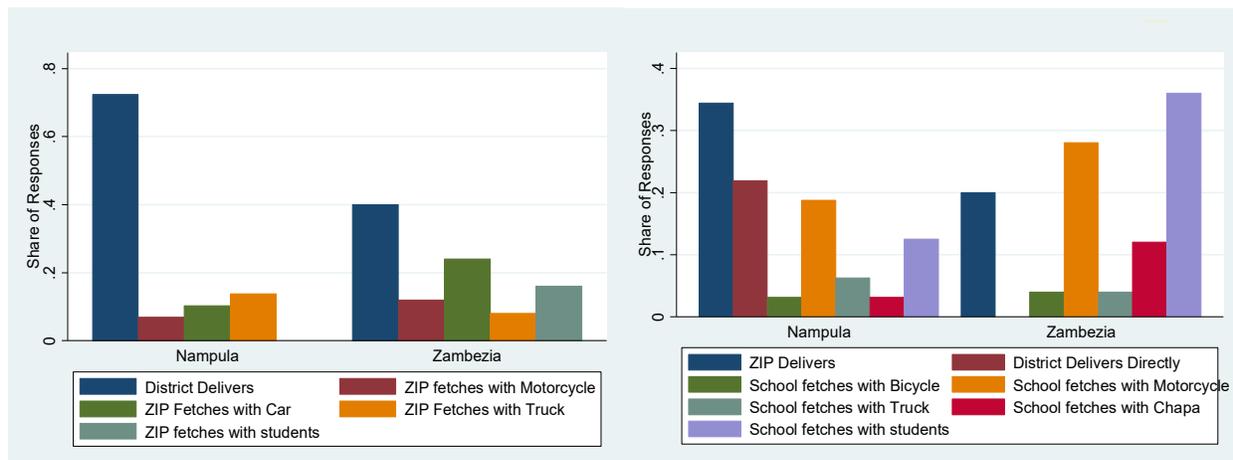


Figure 6: How books get from district to ZIPs (left) and ZIPs to schools (rights)

In 2020, an average of 2.8 lots of books were received by districts from the province and districts made 3.25 distributions this year. Effective and cost-effective transportation for textbooks is difficult to arrange. Book delivery needs many vehicles over a short period of time. Besides shortages of fuel and a lack of transportation payment budget, there is not enough capacity for book delivery logistics. There is also a problem of access. Of the ZIPs in the final study survey, 18.42% are on islands. Many districts and ZIPs follow book distribution plans that are based on access roads, distance, enrollment, and adequate warehouses. Some prioritize remote schools, while others are ad-hoc and first come first served for pickup.

“As we normally receive books in multiple shipments, we wait for all the shipments to be delivered for us to arrange transportation to deliver books to ZIPS and schools. This is because if we deliver books as soon as the first shipment is in, we will spend a lot on transportation as this poses a huge challenge to our limited budget and resources” – Anibal Fombe and Maria Noventa, Milange & Nacala-a Velha District Office Directors

There is an opportunity to streamline working with local transportation businesses that have the financial capacity to deliver books to ZIPs and schools. Prioritizing difficult-to-access districts in book delivery was strongly recommended by the Pebane district for instance, and this can be a standard for districts delivery/service plans.

1.3.4. Book Storage

Waterproof book storage is generally available at districts, often insufficient at the ZIP level, and low at schools. Given the inclement rainy season’s effect on book distribution, waterproof book storage is key to reducing book damage. While the space/volume need for storage at schools is not high, ZIPs cater to 4.79 schools on average and need dedicated storage. Of schools surveyed in 2020, 88.1% believed that storage at the ZIP level helps keep their books in good condition. Additionally, 49.2% schools believe that book storage at ZIPs can help distribute books on time, speeds up the book distribution process (32.5%) and improves book distribution rates (23.8%). As mentioned earlier, only 3.95% of ZIPs report having been provided a budget for book warehouses or storage.

Livros a Tempo explored whether an RBF could lead to book storage construction and repair at the ZIP level, as well as whether that would have an impact on distribution timelines and book availability at schools.

1.3.5. Inventory and Recordkeeping

Regular inventories are supposed to be done at schools, ZIPs and districts but in practice are not carried out. Our surveys conducted with district offices, ZIPs, and schools, revealed that most of them are not aware of how often book inventory should be conducted as per MINEDH guidelines. Most districts and ZIPs conduct an inventory of books once a year (see Figure 7).

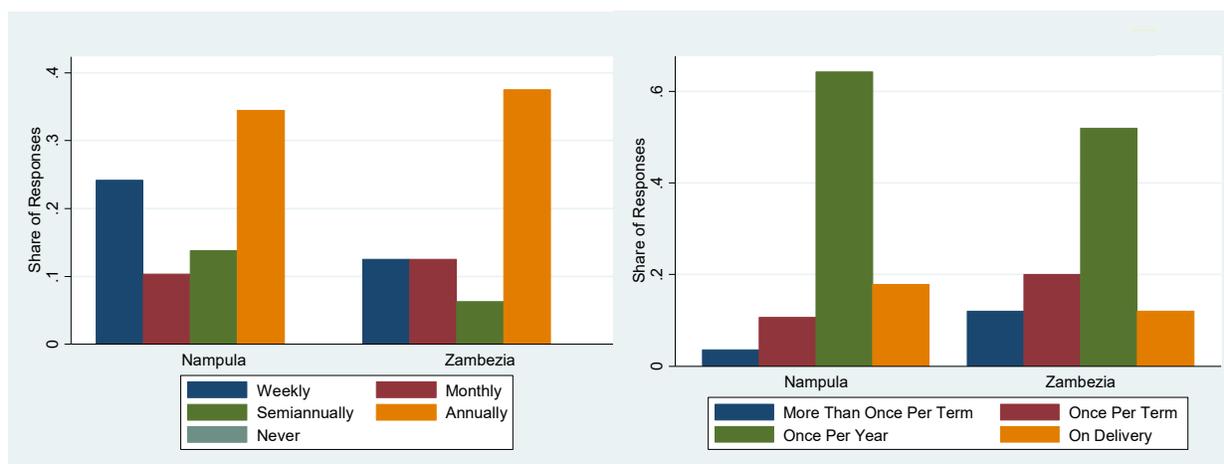


Figure 7: Inventory Frequency at districts (left) and ZIPs (right)

In the 2020 survey, we observed that 51.4% of schools, 36.8% of ZIPs and 35% of districts had no current inventory records. Further, as the project painfully learned, despite paper copies of receipts expected to be filed at districts, ZIPs and schools, they are often missing and at the very least disorganized and not easy to place. We observed in April/May 2020, 36.5% of schools did not have book delivery receipts from 2020 despite having just received the books, and 53.9% of schools did not have the receipts from 2019. For ZIPs similarly, 14.47% did not have the 2020 delivery receipts and 39.5% did not have 2019 receipts. There are serious problems around record-keeping, especially receipt management at the ZIPs. Some ZIPs have no book receipts or paper-based evidence acknowledging receipt of books. It was also evident during our field visits that there is no effective control system of books distributed to pupils at the school level. Many schools we went to have no register of books allotted to pupils. For the purpose of the study, we were able to eventually fill in gaps in book delivery receipts at ZIPs and schools from copies at districts.

In 2016, a book inventory system was introduced by MINEDH in some Nampula districts for teachers to track numbers of received books and understand how many students receive books, though this system has not made its way to the remote districts in the Livros a Tempo program. Better records of receipts and inventory, perhaps with a digital system, is a solution that deserves consideration. It is unclear whether the piloted inventory system has shown positive results and is being scaled. Further, conducting regular inventories can perhaps be incentivized, with incentives suggested by district staff

such as stationery, didactic materials and bonuses distributed to teachers, schools, and ZIPs that conduct clear and regular inventories.

1.3.6. Book Maintenance and Replenishment

Since 2004, books have been free in public schools from Grades 1 to 6 and the Ministry is now working on negotiating free books for Grades 7 to 9. The Ministry aims to provide one book for each child. In Grades 1 to 2, one hundred percent of books are supposedly replaced each school year; from Grades 3 to 6, 40% of books are replaced or replenished by the Ministry. However, books degrade faster at schools than the replenishment rate. Books are sent home with students. For example, Angoche district reported that since schoolbooks are free of charge from Grades 1 to 7, students and parents do not value books.

Solutions around better maintenance and perhaps returning books are worth exploring. Suggestions made by district staff included wrapping books with strong cover paper, storing books in safe places in plastic bags, and incentivizing teachers and students with school bags, stationery, and exercise books for schools with the highest book replenishment rate. Any RBF around book maintenance should account for potential perverse incentives to not use the books.

Also, it is important to consider that schools are not receiving the number of books submitted in requisitions based on enrollment projections. Thirty-five percent of districts reported that they received fewer books than the expected number for the 2020 school year. For example, the Mogincual district pointed out they receive around 30% of books needed. It reported that they believe the book delivery plan for the province does not account for the district book delivery plan. This could be because the enrollment projections submitted by the district may not be used by the province to inform book delivery. Better tracking of requisitions and distribution plans, perhaps digitally, can provide transparency into how many books are being published and allocated for schools compared to requisitions based on replenishment policy.

1.3.7. Communications

Communication between levels of the book delivery chain can break down with negative consequences. For instance, books are delayed and ZIPS do not feel like they were given adequate notice. Forty-five percent of districts reported not receiving regular updates on distribution from MINEDH.

Communication channels need to be improved between entities, particularly downstream. We understand that there is a WhatsApp group for coordination on book distribution between MINEDH, the provinces and districts. These groups or new groups can be set up for coordination between districts, ZIPs and schools. For socialization of the Livros a Tempo RBF, the project encouraged district participants to set up a WhatsApp group that is currently functional with members sharing information related to the project, delivery receipts, photos and more. Districts and ZIPs would like to see this type of simple solution continue and scaled.

1.4. Impact of COVID-19

- Due to COVID-19, a national emergency has been in effect in Mozambique since April 1 and schools have remained closed
- Teachers are preparing exercise for students, but learning progress is not being evaluated and many schools and districts think there will be no graduates this year
- Many schools reported not having sufficient books to send home during the pandemic, especially Grade 5 books

As of November 1, 2020, Mozambique has 12,988 confirmed cases of COVID-19, with Nampula and Maputo being the most affected provinces. A national emergency has been in effect since April 1, 2020 and schools have been closed, affecting more than 8.4 million students. On September 7, Mozambique moved from a State of Emergency to a State of Public Calamity, which will continue indefinitely. Social distancing and confinement measures remain in place to flatten the curve of transmission.

Evidence from other contexts, including the Ebola epidemic, indicates that the longer schools are closed, the less likely students will return, increasing generational illiteracy and exacerbating learning crises. The impact of the pandemic and school closures can be severe. It will also create significant obstacles to applying Results Based Financing at a subnational level, particularly as different communities may experience worse outbreaks and heightened disparities.

In collecting data for the final study, the team incorporated COVID-19 response questions into the survey instruments for the data collected remotely in Zambezia in April-May 2020. Out of 104 Zambezia schools surveyed, 77% indicated they have response plans for the pandemic. The plans are focused on disease prevention such as handwashing, using masks and social isolation, as well as distance learning, primarily manifested in distribution of exercises to students.

Teachers, all of whom are still getting paid, are focused on preparing exercises and brochures for students, regularly visiting parent or guardians in-person, and checking in over the phone. While schools are communicating with families regularly in this way, the absence of churches and places of congregation during the pandemic have posed challenges in getting the word out.

However, 30% of school principals think that students are not studying at home. Teacher visits and follow up are often focused on encouraging students to continue to study. Schools are worried about student motivation, abandonment because of school closures, premature marriages for girls, and student reintegration and the perception of the virus.

As one district director put it, as of now the “[distance learning] is a family learning program. Parents in charge continue to accompany their students in the lessons. Support from organizations is for accompanying material so that the students have the content.” However, 22% of the schools think that parents are the biggest barrier to distance learning for their children due to disinterest in the process.

Beyond the provisions of exercises to students, there is a community radio show in some communities. 31% of schools believe that biggest barrier to distance learning is the lack of internet or devices at homes. Radio, phone calls, memory cards for phones, and television seem to be the most appropriate

technology or communication mediums to get educational content. Irrespective, all districts and nearly all schools believe that much more investment is needed in distance learning.

Currently the learning progress or performance of students is not being evaluated. Many schools and districts think there will be no graduates this year, and half the schools believe that students will have to repeat their grades and an additional quarter of the schools are on the fence on the topic.

Most schools surveyed in April and May thought that classes will resume by June but this has not been the case. Districts and schools are nearly equally split on whether to reopen. Half the follower schools believe they will not be safe when reopened with 52% of them reporting that they do not have processes and facilities to monitor health of students and teachers, and half the districts worried particularly about class sizes. ZIP leader schools, that are more directly connected to the district offices than follower schools, have a more positive outlook articulating faith in the Ministry and 68% of them reporting having processes and facilities to monitor the health of students and teachers.

While awaiting formal guidance on school reopening, some schools are looking at improving distance learning by creating groups of teacher staff to monitor students, while others are looking into changes for when schools resume such as building more classrooms to reduce the number of students in classes and adapting teaching practices. Concerned about how students will catch up, suggestions range from adjusting the curriculum to extending school hours.

In terms of books, all students who are provided books take their books home and have them at home during the current school closures. Still, 45% of schools reported not having sufficient Grade 1 books to send home during the pandemic. Sixty-three percent of schools reported not having sufficient Grade 2 books and 70% of schools do not have sufficient Grade 5 books. The lack of teaching and learning materials at homes was reported by 13% of the schools as the biggest barrier to distance learning.

All the Zambezia districts offices believe that the pandemic will have no impact on book distribution. Most of the schools believe the same with only 13% reporting some potential adverse impact on book distribution, such as the late arrival of books this year leading to books not being able to be distributed given the schools closures. Schools and districts are not yet considering the impact of school closures and the pandemic emergency for book availability for the 2021 school year. We anticipate the effect could be severe starting from inaccurate enrollment reporting and request from schools, to disruptions in printing and book supply chains, more significant budget burdens for districts and ZIPs, and economic impact on logistics and transportation providers.

2. Learnings from RBF Application in Book Distribution

Livros a Tempo held a multi-day RBF co-design event in Nampula in August 2019, whose participants included Remigio Ernesto Rainde (head of the MINEDH Book and Didactic Materials Department), Constantino Pirai and Hélder Augusto (heads of the Zambezia and Nampula provincial education offices), district book planning technicians and the district directors from all twelve target districts, as well as Livros a Tempo program staff. Ten key insight statements were summarized from the contextual study conducted earlier in the year in Nampula and Zambezia, which served as the basis for the co-design event. These highlighted challenges around inventory, enrollment records, book degradation, book receipts, storage, and delivery. Various solution ideas were generated, and all participants were asked to prioritize challenges and vote for the RBF concepts.

The top solution by far in terms of support from the participants was to incentivize storage construction at the ZIP level so that books could be brought there before the rainy season and stored there through the rains for easier distribution to schools after the rains pass. Previously, districts were not able to deliver books before the rainy season due to a lack of waterproof book storage at ZIPs, meaning books were arriving after the beginning of the school year. Among the various challenges and proposed solutions, incentivizing storage construction also lent itself most favorably to a RBF program in the book chain; there was a clear stakeholder responsible for ZIP storage: ZIP coordinators. ZIP coordinators, who are the school principal of the ZIP lead schools, could be incentivized with individual incentives and had the potential ability to bring together community resources for book storage construction or repair without advanced payments, as opposed to transportation budget issues which while acute need policy change to make existing allocated funds available earlier to district education offices.

“When Madeira [Livros a Tempo Project Coordinator] came to me, I agreed to support from the central office. I’m really excited to get this result. I’ve visited many districts in this room. Storage or warehouse is a big problem. It’s a big issue is to recover books from schools and store. There is need to store for a couple months before distribution. All of them [districts] point to this as the biggest problem.” – Remigio Ernesto Rainde, MINEDH Book and Didactic Materials Department Head

After validating the RBF approach with relevant stakeholders, Livros a Tempo then implemented the RBF program by developing a set of competition rules (disbursement-linked indicators) that outlined the requirements to win ten ZIP awards and three district awards in each province (20 total ZIP awards and 6 total district awards). The contextual study revealed that remote ZIPs and associated schools are most impacted in the book chain and in book availability, and the co-design wanted to see the RBF prioritize remote areas. As such, in each district only the 10 furthest ZIPs from the district office were qualified to compete, totaling 114 qualified ZIPs. These remote ZIPs were on average 38 kilometers away from the district offices in Nampula, and 88 kilometers away from the district offices in Zambezia, with some as far as 181 kilometers away.

The rules required ZIPs to construct new storage or repair storage before the rainy season began; storage structures had to be waterproof and be large enough to hold all books delivered by the district; books had to be provided to all follower schools by the first month of the school year. ZIPs were asked to submit before and after timestamped photos of repaired or newly constructed book storage to the

project and submit receipts of book delivery. The first ten ZIPs to fulfill the RBF requirements in each province won and were awarded 50,000 MZN (about 700 USD) to their respective ZIP coordinators. Requirements for districts included informing ZIPs of the award rules and collecting photos of book storage unit construction or repair. To win, districts had to ensure books were delivered to ZIPs before the 2020 school year began and at least one ZIP had to win the ZIP competition. Three districts in each province that fulfilled the requirements were awarded 1st (60,000 MZN), 2nd (50,000 MZN) and 3rd (40,000 MZN) place awards to district directors in order of the districts with the most number of ZIPs that were successful in winning the ZIP competition.

The project conducted a series of socialization and training sessions in each target district in Nampula and Zambezia to share the RBF award rules. These socialization and training sessions were targeted at ZIP coordinators from the twelve districts, and 160 ZIP representatives participated in these sessions. To implement and monitor the RBF, the Livros a Tempo project engaged districts via WhatsApp, phone calls and email. The districts in turn engaged ZIPs.

All envisioned ZIP and district RBF awards were made out, with Mongincual, Larde and Nacala-Velha districts in Nampula winning the district level awards in order from first to third, and Pebane, Luabo and Milange districts in Zambezia winning awards in the same order. In early 2020, following book storage construction and book distribution, Livros a Tempo conducted a final study of the RBF incentive program and book delivery to schools in the project's target districts. This section covers the results of the RBF program from the final study.

2.1. RBF Results

2.1.1. Book Storage

- The RBF program only committed to give awards to 20 ZIPs, but nearly three times that many ZIPs, 58 in total, constructed or repaired storage
- Book storage availability in the surveyed ZIPs increased from 29% to 81.5% due to the RBF
- The more distant or remote the ZIP, the more likely it was to engage in the RBF to build or repair storage

Construction of book storage at ZIPs was a key outcome of the RBF. Book storage at the ZIP-level addresses barriers in the book delivery supply chain at the local level and protects books from damage. For books to arrive in time for the start of the school year in February, districts and ZIPs must transport them before the rainy season. This is not possible without waterproof storage at ZIPs to protect books from water damage. The construction and repair of waterproof book storage means that in the future book delivery does not have to be delayed and can be completed before the school year begins.

In Nampula, 45 ZIPs were qualified to participate in the RBF competition and a sample of 36 of these ZIPs were surveyed for the final study. In Zambezia, 58 ZIPs were qualified to compete and a sample of 39 were surveyed.

How many ZIPs built or repaired storage?

Of the ZIPs surveyed in the final study, only 29% had storage in the last school year (2019), but 81.5% do now (2020), a direct result of the RBF.

In Nampula, out of the ZIPs that were surveyed 21 (58.3%) built new storage, 9 (25%) repaired existing storage, and 6 (16.6%) ZIPs neither built nor repaired storage. All ZIPs that successfully competed in the RBF competition were surveyed. Book storage in Nampula was photographed and inspected by enumerators and all storage facilities met the size and waterproof requirements of the RBF intervention.

In Zambezia, out of the ZIPs that were surveyed 22 (56.4%) built new storage, 6 (15.3%) repaired existing storage, and 11 (28.2%) ZIPs neither built nor repaired storage. Due to the COVID-19 pandemic, enumerators could not visit ZIPs in Zambezia in person. Construction was confirmed using photos sent from the ZIPs and conversations with ZIP coordinators.

The storage units built or repaired met the RBF conditions such as size and waterproof requirements. All but one withstood the 2019-2020 rainy season, with one reporting some ceiling damage.

These results indicate that there was a lack of waterproof storage at the ZIPs and the RBF intervention fulfilled this need. In both Nampula and Zambezia, the number of ZIPs with waterproof book storage increased significantly for this school year. The survey results showed that most ZIPs did not have waterproof storage in 2019, validating the program's hypothesis that remote ZIPs did not have sufficient book storage. The RBF program only committed to give awards to 20 ZIPs, but 58 ZIPs, nearly three times that number, constructed or repaired storage. It should also be noted that potentially more than 58 ZIPs built or repaired storage, since the project sampled from the qualified ZIPs for the final study (see Appendix 2: Methodology).

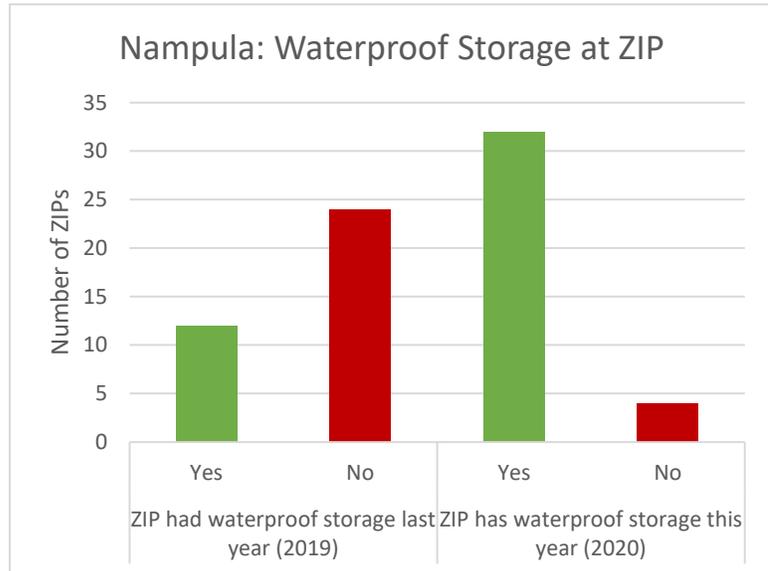


Figure 8: Availability of waterproof storage at ZIPs in Nampula

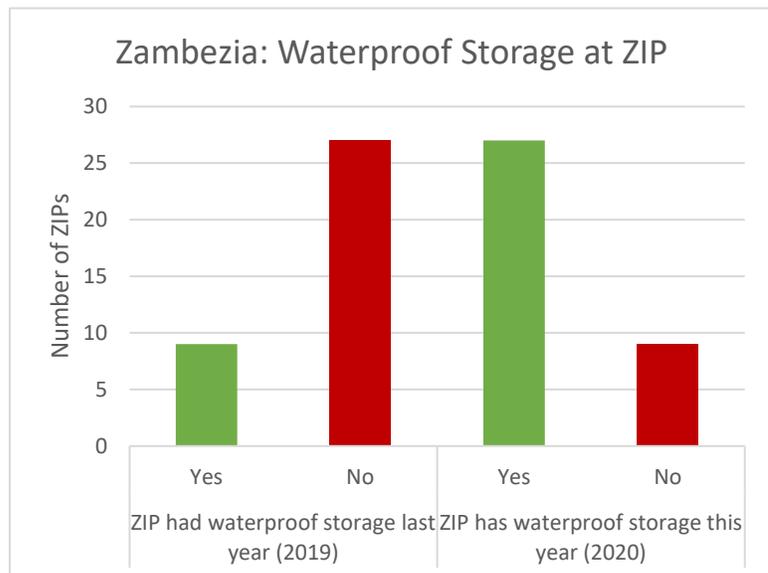


Figure 9: Availability of waterproof storage at ZIPs in Zambezia



Figure 10: Photos of book storage in Maculane A ZIP in Mogincual district in Nampula before (top left) and after repair (top right) and in Nagonha ZIP in Pebane district in Zambezia before (bottom left) and after construction (bottom right)

Did remoteness have anything to do with it?

According to data collected in Nampula, ZIPs located further from the district were more likely to construct book storage (see Figure 11). This may be because more remote ZIPs were less likely to have waterproof storage. The RBF prioritized remote schools based on information gathered for the contextual study that revealed significant gaps in book delivery at this level.

In Zambezia, ZIPs located further from the district were also more likely to construct book storage (See Figure 12). Many ZIPs in

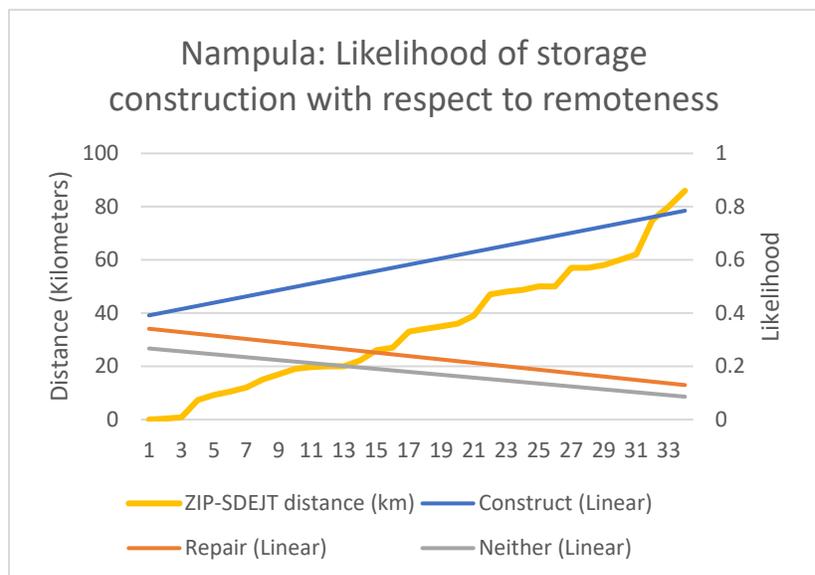


Figure 11: Distance and Construction Reporting in Nampula

Zambezia that qualified for the RBF (the 10 furthest from each district) are located further than those that competed in Nampula. The furthest ZIP in Zambezia is located 150 kilometers away, while the furthest in Nampula is only 80 kilometers from the district.

The graphs on the right show the ZIPs ordered by distance from the district office. The linear lines indicate the likelihood of a ZIP constructing or repairing a book storage, and as can be seen from the positive slopes that ZIPs were more likely to construct a book storage the further they were from the district office. When asked during the survey about why they constructed storage, the top response was a need to deliver books on time. It is likely that remote ZIPs in both provinces prioritized book storage construction to improve book delivery to their schools because this was a gap in the book delivery supply chain that needed to be filled at the ZIP-level.

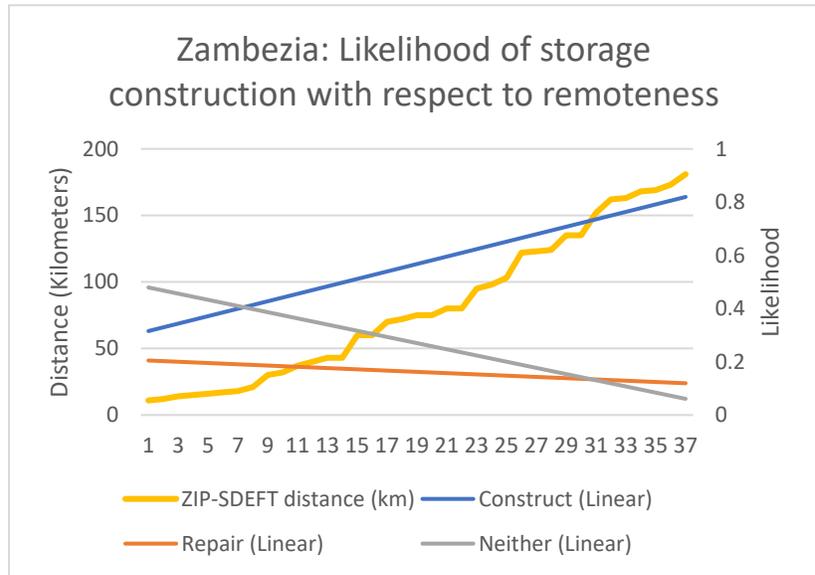


Figure 12: Distance and Construction Reporting in Zambezia

Were the built and repaired storage units used?

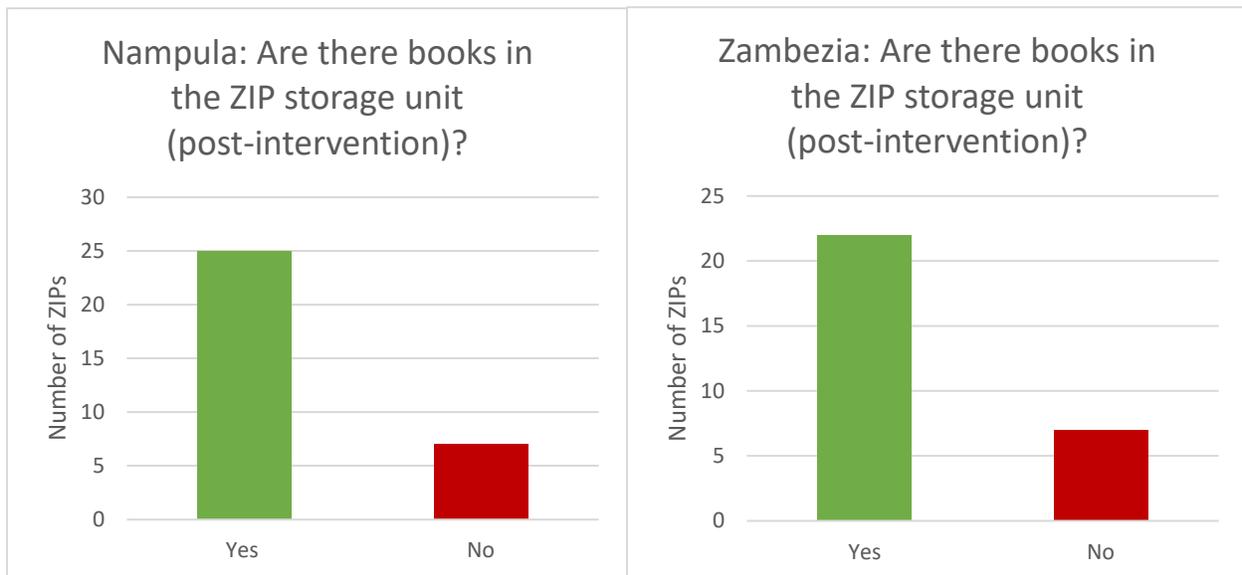


Figure 13: Reported storage usage at ZIPs post-intervention in Nampula (left) and Zambezia (right)

Figure 13 shows the number of book storage units that are actively in use by the ZIPs in Nampula and Zambezia. In Nampula, the survey found that 78% (25) of ZIPs are storing books in their storage units and 22% (6) ZIPs were not storing books in a storage unit. In Zambezia, 75% of ZIPs (22) reported that book storage is in use and 25% (7) of ZIPs were not currently using storage units.

Enumerators in Nampula observed hundreds of books in the storage units, indicating the need for storage for surplus or books returned by students even after distribution of books to follower schools and students. Enumerators also observed that books were not touching the ground in the storage and were being kept on shelving or on raised beds. This was not a condition of the RBF and indicated that the ZIPs were not competing just for the RBF award, but are genuinely committed to better storage.



Figure 14: Photo of book storage in use in Txalalane ZIP in Pebane district in Zambezia

A significant portion of ZIPs in both provinces reported that the storage units are currently in use, further indicating that the RBF intervention fulfilled a need in the book supply chain. While the survey did not ask ZIPs why book storage was not utilized, this could be due to a multitude of factors, such as books being fully distributed to follower schools and students.

Why did some ZIPs take up the RBF challenge and build storage?

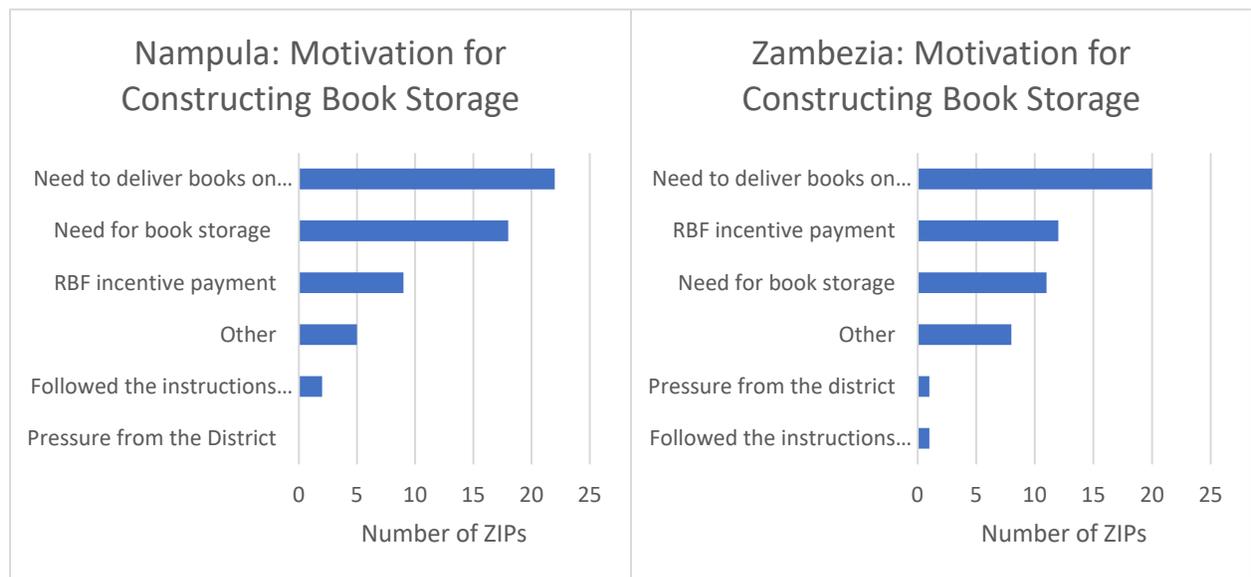


Figure 15: Reported motivation for building or repairing book storage in Nampula (left) and Zambezia (right)

During the survey, ZIPs were asked what factors motivated their decision to build book storage; ZIPs could select multiple options. In Nampula, the biggest motivation was the need to deliver books on time, indicating that book storage is an important component to timely book delivery and ZIP coordinators believed that storage would help them distribute books in time. The need for book storage

was the second biggest motivating factor, indicating that ZIPs did not have other options for waterproof storage. Nine ZIPs reported that the RBF monetary incentive also contributed to the decision to build storage, and clearly served as a motivator to the ZIPs to prioritize it.

In Zambezia, the need to deliver books on time was also the primary factor in ZIPs’ decision to build book storage. The RBF incentive and the need for waterproof book storage also motivated ZIPs to build storage units. While the RBF incentive was a motivating factor in both provinces, timely book delivery and protection of books from damage also contributed to the decision to construct storage.

The ZIPs that did not build or repair storage either already had storage, did not know about the RBF, or were not able to gather the resources to build. For the latter, direct funding is recommended. In Nampula, some ZIPs did not enter the RBF competition, and some did not successfully complete storage construction. Of these, only one ZIP reported that the school already had waterproof book storage. Six ZIPs reported that they could not gather the necessary resources to build storage and two stated that they did not know about the RBF award.

In Zambezia, six ZIPs reported that they did not build or repair storage because they could not gather the necessary resources to complete construction or repair. Seven ZIPs reported already having waterproof storage and therefore did not compete.

How did ZIPs garner the resources for book storage construction?

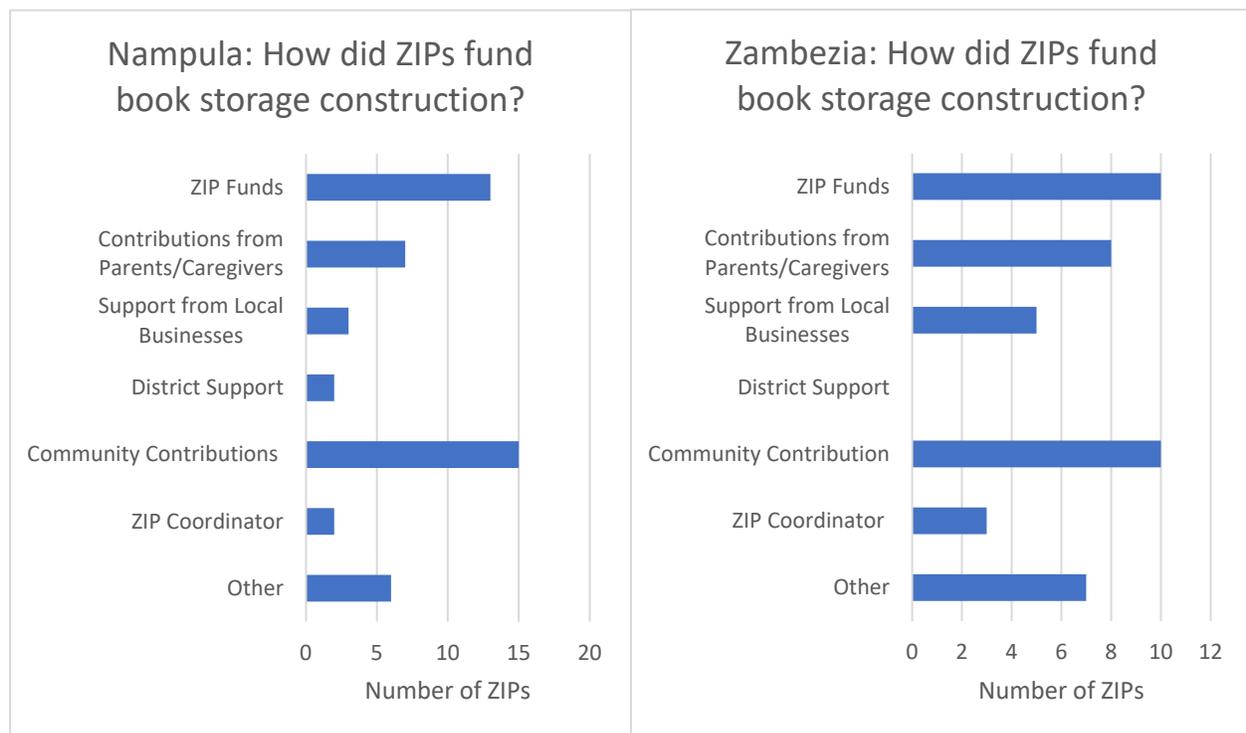


Figure 16: Reported motivation for building or repairing book storage in Nampula (left) and Zambezia (right)

To build the storage, the ZIPs mostly used community and parent contributions and ZIP funds. Some tapped into local loans, the ZIP Coordinator’s personal money and one ZIP reported using funds from the Direct Support for Schools (Apoio Directo às Escolas) program financed by FASE (Education Sector Support Fund or Fundo de Apoio ao Sector Educacao).

In Nampula, ZIPs mostly funded book storage using ZIP funds, community contributions and, to a lesser extent, contributions from parents/caregivers. Only one ZIP reported support from the district and only three listed local businesses. For ZIPs that responded “Other”, they indicated support from the ZIP Coordinator or other school employees.

In Zambezia, ZIPs reported that book storage construction/rehabilitation was funded using ZIP funds and community contributions. Some ZIPs also received support from local businesses and parents/caregivers. Five of the surveyed ZIPs that responded other for this question reported could not collect enough funds or resources to complete storage construction. Other ZIPs that responded “Other” reported that the ZIP Coordinator provided funds for construction or repair. Four ZIPs reported that loans or personal funds were used.



Figure 17: Photograph of book storage construction at a ZIP in Milange district in Zambezia province, October 7, 2019

The labor to build the storage came from the school board and the community. Follower schools in the ZIPs chipped in, with 19% of follower schools providing ZIP financial support, 15% manpower and 8.7% construction materials for the ZIP book storage. The time it took to build the storage varied for different ZIPs, but on average was three to four weeks.

These findings suggest that ZIPs in both Nampula and Zambezia were able to both allocate some existing funds in the budget and mobilize community support to fund book storage construction. Almost no ZIPs received financial assistance from districts, suggesting that funding was mostly generated locally.

2.1.2. Book Delivery

- Book delivery timing varied widely across districts in both provinces
- In Zambezia, time to delivery from districts to ZIPs to follower schools improved much (decreased) for ZIPs that built or repaired storage, but it is inconclusive whether it was the result of the RBF
- In Nampula, time to delivery from districts worsened some (increased) some from last year

Since the RBF led to the construction or rehabilitation of waterproof book storage units at many ZIPs in Zambezia and Nampula, timely book delivery was another potential outcome of the RBF competition. The following section details observations from book receipt data and the survey responses. Due to the limited sample of ZIPs that do not have book storage or did not compete in the RBF, no causal relationship can be shown. Instead, this section provides insight on average dates books arrived at schools compared to last year and the average time to delivery from district to ZIP to follower school. In the following section, results are disaggregated by ZIPs that already had storage, ZIPs that do not have storage, and ZIPs that built or repaired storage. Survey results revealed that many ZIPs that the project

thought had not participated in the RBF actually did build or repair storage in response to the program. These ZIPs did not submit photos, thus disqualifying them from winning the awards, but are considered in this analysis and ZIPs that competed.

Livros a Tempo collected book receipt data and enrollment data from districts, ZIPs, and follower schools. During this process, it became clear that this data is sometimes not readily available and there were challenges in obtaining complete, quality datasets. Gaps include a lack of dates on some book receipts at some ZIPs and schools and lack of enrollment data for ZIP schools and follower schools. Districts helped fill data gaps by providing enrollment data for some ZIPs and follower schools and by providing their records of delivery dates to ZIPs. For this study, ZIPs are broken out by those who built/repaired storage, those who had storage, and those who had no storage. The data is broken into these categories to understand if the storage RBF competition had any impact on book delivery timing.

- **No storage:** ZIPs that reported no book storage as of this school year. Please note, the sample size for these ZIPs is relatively small (5 – 10 ZIPs).
- **Had storage:** ZIPs that had storage last school year, prior to the RBF intervention. Please note, the sample size for these ZIPs is relatively small (5 – 10 ZIPs).
- **Built/Repaired Storage:** ZIPs that did not have storage last year and participated in the RBF competition.

Book Delivery to Districts

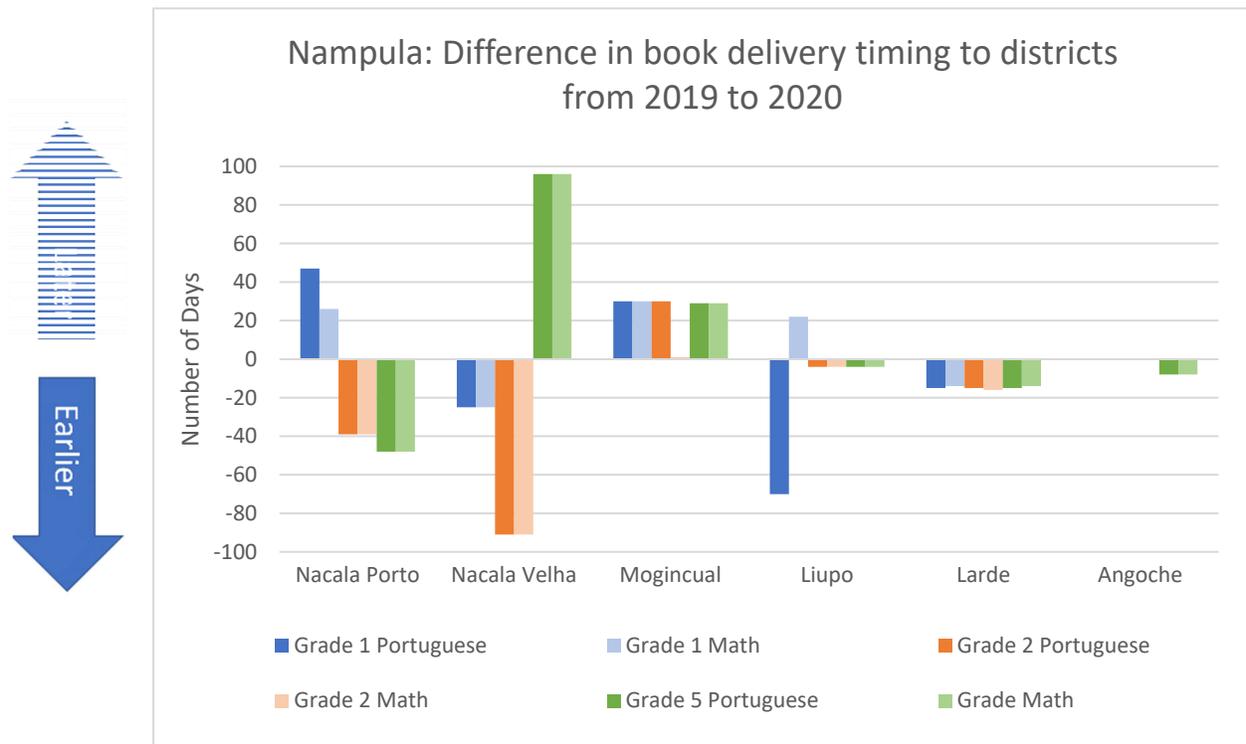


Figure 18: Difference in book delivery timing from 2019 to 2020 in Nampula

Book delivery dates in Nampula varied across districts. Figure 18 shows the difference in delivery timing (the difference in delivery dates from last year to this year) at districts for the last shipment of books

from last year to this year – negative values indicate the number of days books were delivered *earlier* than last school year, positive values indicate the number of days books were delivered *later* this school year.

In all districts except Mogincual, the last shipment of books for some grades were delivered earlier this year than last school year. In Nacala Porto, books for Grades 2 and 5 were delivered in February, over a month earlier this year than last year, while books for Grade 1 were delivered about a month later this year. In Nacala Velha, books for Grade 1 were delivered in December, slightly earlier this year and books for Grade 2 were delivered in January, which was significantly earlier than last year. Grade 5 books were delivered to the district about three months later this year than last. There are significant differences between grades for some districts because books for different grades are delivered in different shipments. All books in Mogincual were delivered in February, about a month later this year than last. In Liupo, most books were delivered around the same time, except for Grade 1 Portuguese which was delivered in October, almost two months earlier than last year. In Larde and Angoche, books were delivered in January, around the same time as last year.

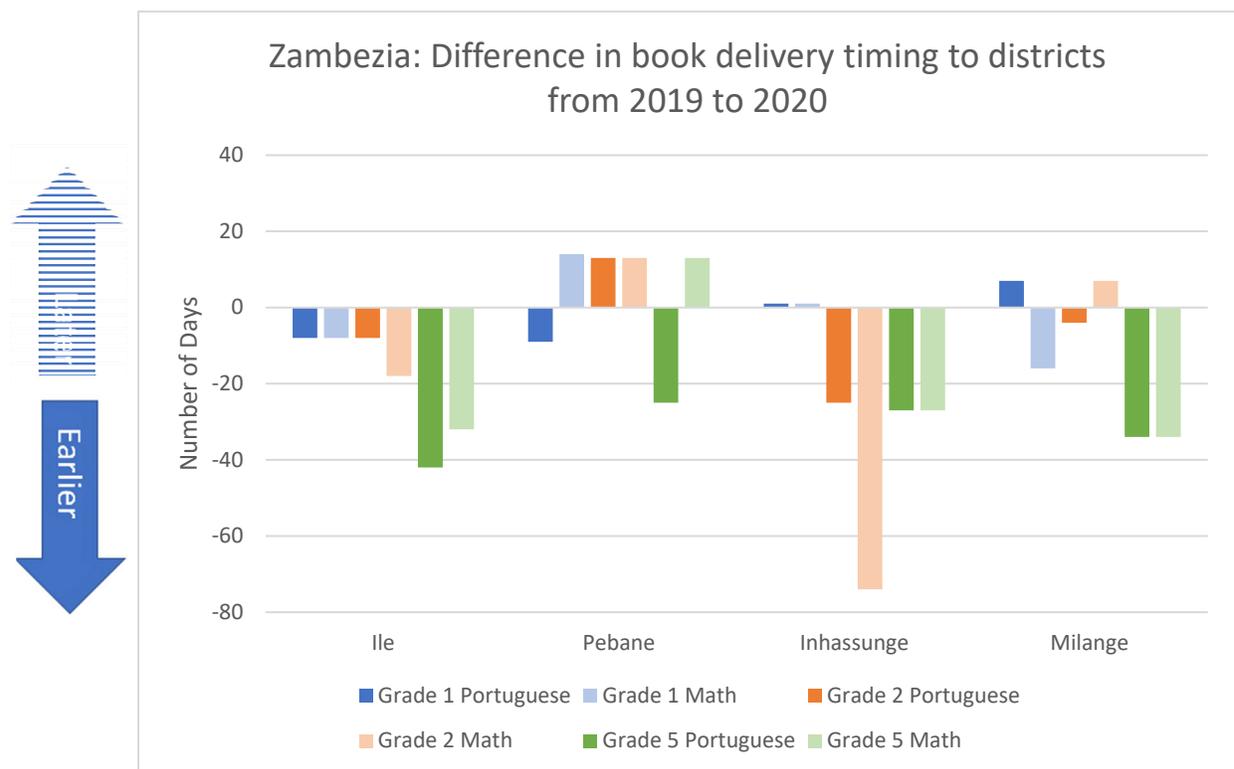


Figure 19: Difference in book delivery timing from 2019 to 2020 in Zambezia

In Zambezia, for many districts the last shipment of books arrived earlier or around the same time as last year (within the same month). Books for different classes arrive in different shipments, which is why this analysis is disaggregated by grade and subject. In Ile, this was the case except for Grade 5 Portuguese and Math books, which arrived in January, over a month earlier than last year. In Pebane, books arrived within 30 days of the date they arrived last year, with Grade 5 Portuguese arriving 25 days early and other grades arriving 13 to 14 days later. In Inhassunge, books for Grade 2 Math arrived in December, earlier than last year by over two months. Books for other grades and subjects arrived in January this

year, around a month earlier than last year. In Milange, most books arrived in January, around the same time as last year, except for Grade 5 Portuguese and Math, which arrived over a month earlier. Due to the need for remote data collection and a lack of response from some districts, Livros a Tempo was not able to collect book receipts for Morrumbala and Luabo at the district-level.

Districts receive multiple shipments of books before and during the beginning of the school year and provided Livros a Tempo with the date of the last shipment of books received by the districts. Delayed book delivery to the districts leads to delays down the book delivery supply chain. Province to district book delivery is outside the scope of the project’s intervention and survey, as the RBF intervention focused on incentivizing book delivery from districts down. Livros a Tempo looked at book delivery dates to districts to assess what may have impacted the local book delivery supply chain. Books arriving later at districts could have impacted the delivery date at the ZIP and follower schools and earlier delivery means districts and ZIPs may have been able to move up delivery dates at the local level.

Book Delivery to ZIPs

Did the time it take for books to get from district to ZIP decrease or increase over last year?

The charts to the right show the change between last school year and the current one in the average number of days between the last shipment of books arriving at the district and the books arriving at the ZIPs. Books for all grades and subjects arrived at ZIPs on the same day. The data Livros a Tempo collected from districts regarding delivery dates and the number of books only included the dates of the last shipment of books to districts and ZIPs hence this is used in the calculation.

The time it took for books to get from districts to ZIPs in Nampula increased from last year. Figure 20 shows the difference in time to delivery (TTD) from 2019 to 2020. On average, TTD increased three days for ZIPs that built or

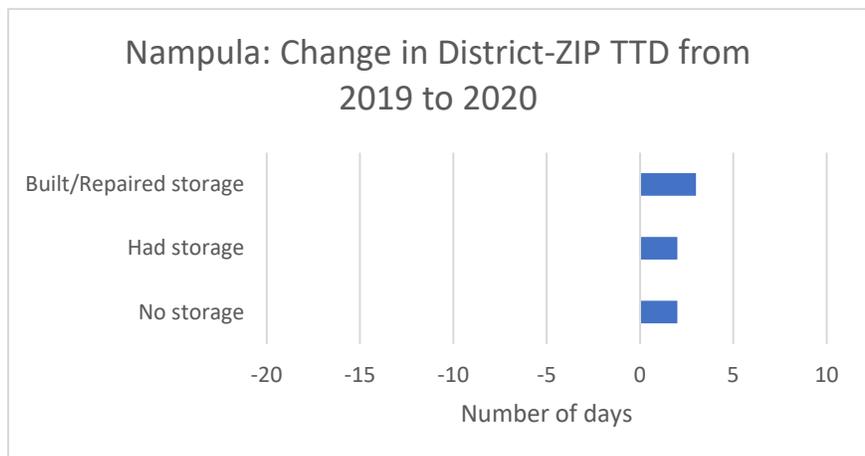


Figure 20: Change in District to ZIP TTD from 2019 to 2020 in Nampula

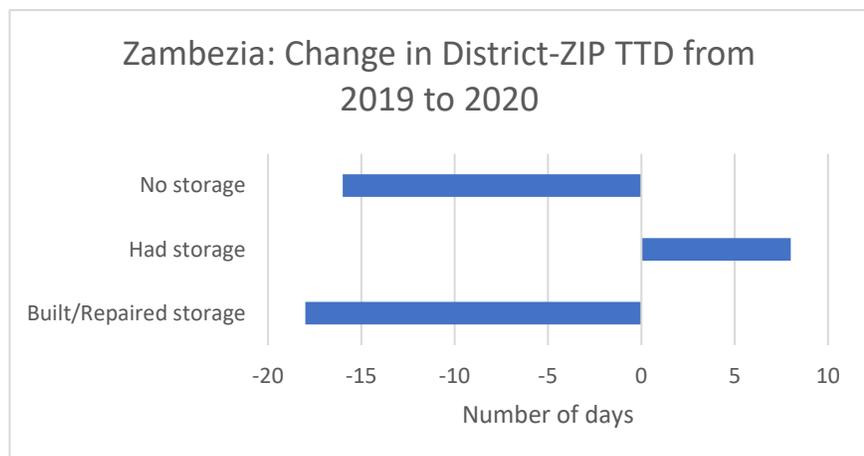


Figure 21: Change in District to ZIP TTD from 2019 to 2020 in Zambezia

repaired storage and two days for both those that had storage and those with no storage.

In Zambezia, time to delivery decreased or improved for ZIPs without storage and those that built storage. ZIPs that already had storage saw an increase in time to delivery. It may be conjectured that districts in Zambezia prioritized getting books to all ZIPs that didn't have storage as a result of the district-level RBF. Districts may be sending books to more remote ZIPs sooner than those closer to the district to ensure books are delivered before the rainy season.

Did the books arrive at ZIPs this year before last year?

Livros a Tempo also looked at the difference in delivery dates at ZIPs and follower schools across the three categories. Livros a Tempo found that at the ZIP and follower school-level, books across subjects and grades arrive on the same date.

In Nampula, book delivery to ZIPs and follower schools was delayed this year in terms of absolute dates. In 2019, books were delivered on average in early January; this school year, books were delivered in late-January and February. ZIPs with no storage experienced the longest delays in book delivery with books arriving an average of 21 days later than last year. ZIPs that already had book storage before the RBF experienced the smallest delays in book delivery with books arriving an average of 3 days later than last year. Books arrived at ZIPs that built or repaired book storage an average of 12 days later than last year.

Zambezia had some delays in book delivery compared to last year, but on average books arrived significantly earlier at ZIPs this school year. Books arrived at ZIPs who previously had storage an average of five days later than last year. For both ZIPs that have no storage and ZIPs that built or repaired storage, books arrived on average 21 days earlier than the previous school year. In 2019, books on average arrived in early to mid- February and this school year, books arrived in late-January.

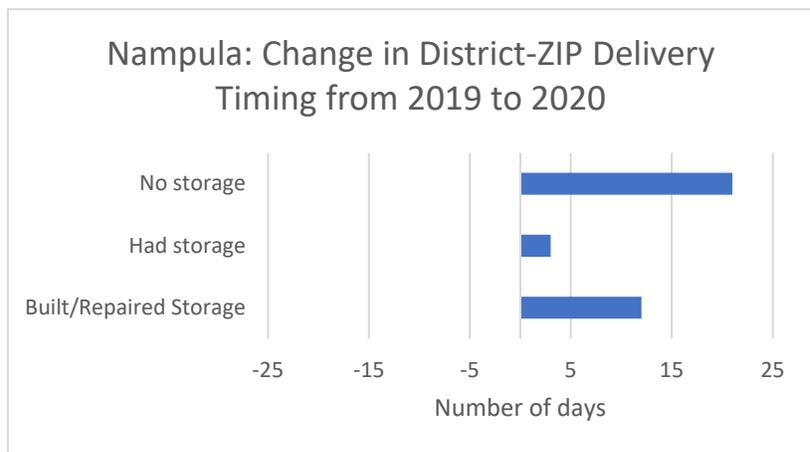


Figure 22: Change in District to ZIP Delivery Timing from 2019 to 2020 in Nampula

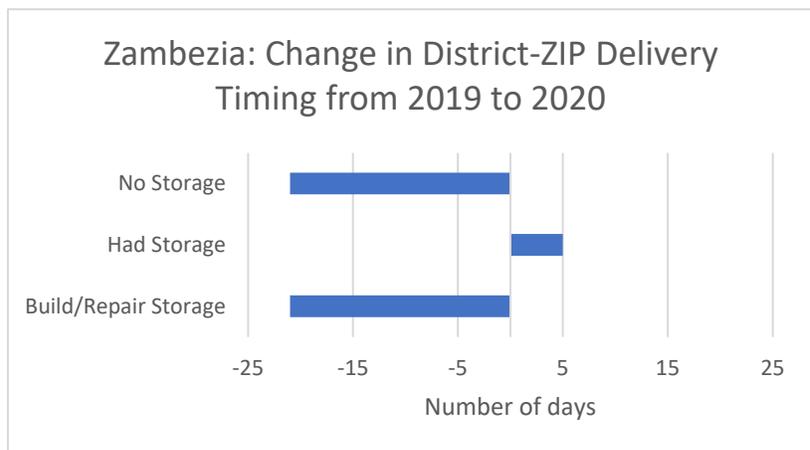


Figure 23: Change in District to ZIP Delivery Timing from 2019 to 2020 in Zambezia

Did remoteness have anything to do with it?

In Nampula, more remote ZIPs saw less change in book delivery dates from last year to this year. Meaning these remote ZIPs experienced less or no book delivery delays than closer ZIPs. This could be due to districts prioritizing delivery to remote ZIPs by default and not prompted by the RBF since all ZIPs included in this analysis were qualified for the RBF.

In Zambezia, more remote ZIPs saw a slight increase in the change in delivery date from this year to last year. Most books in Zambezia were delivered earlier than last year (noted by negative values on the right y-axis). As noted, ZIPs in Zambezia that participated in the RBF are located further from districts than ZIPs in Nampula, which could explain the difference between the two provinces.

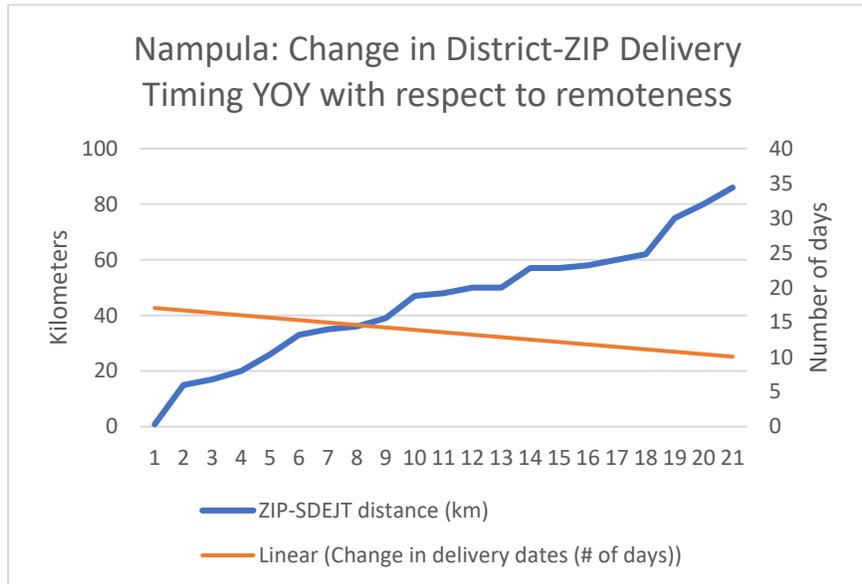


Figure 24: Distance and change in delivery dates from district to ZIP Year over Year (YOY) from 2019 to 2020 in Nampula

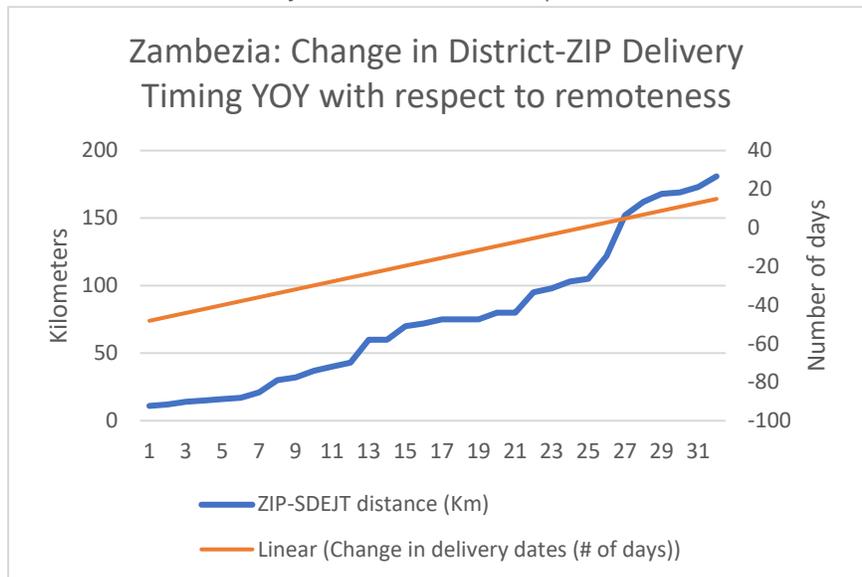


Figure 25: Distance and change in delivery dates from district to ZIP Year over Year (YOY) from 2019 to 2020 in Zambezia

Book Delivery to Schools

Did the time it take for books to get from ZIPs to schools decrease or increase over last year?

Livros a Tempo also compared the time to delivery from ZIPs to follower schools to last year. While follower schools did not directly compete in the RBF, Livros a Tempo is interested in delivery times at the local level. The hypothesis that emerged from the co-design event was that if ZIPs build storage, books could be stored during the rainy season and follower schools would see less delays. The following

charts show the average number of days between the date books were delivered to ZIPs and the date books arrived at follower schools from the sample of schools surveyed.

In Nampula, the time to delivery from ZIPs to follower schools increased slightly from last year to this year. In Livros a Tempo’s sample of schools, in 2019 books were delivered to schools on the same day they arrived at ZIPs. According to discussions with ZIP coordinators, this is because ZIPs contacted schools and asked them to pick up books the same day they are delivered to ZIPs, possibly to mitigate any further delays. Across the three categories, it took an average of 2 to 3 days for books to arrive at follower schools from ZIPs.

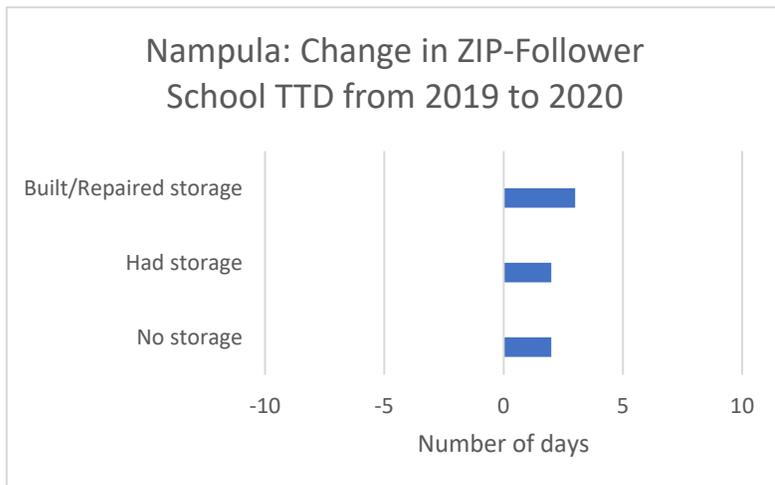


Figure 26: Change in ZIP to follower school TTD from 2019 to 2020 in Nampula

In Zambezia, time to delivery varied across categories. For those that built or repaired storage, books arrived on average two days before the last shipment of books to the ZIP indicating that ZIPs did not wait on receiving all books before distributing to schools. Compared to 2019, this is a six-day improvement. ZIPs often distribute books to schools or have follower schools pick them up the same day they arrive at the ZIPs. In both 2019 and

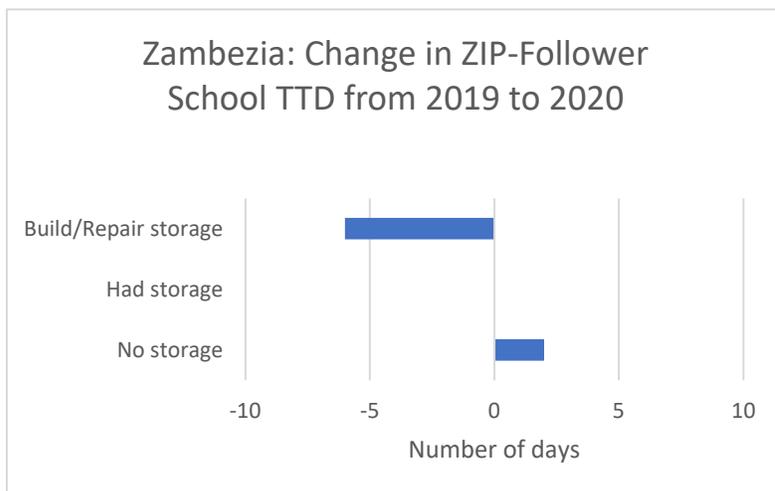


Figure 27: Change in ZIP to follower school TTD from 2019 to 2020 in Zambezia

2020, for schools that already had storage, books arrived at ZIPs and follower schools on the same day. For schools with no storage, books arrived on average two days after they were delivered to the ZIP this school year. Last year, follower schools picked up books or books were delivered on the same day they arrived at the ZIP for those with no storage. Since delivery times between ZIPs and schools were already short, this is not an area for significant improvement in delivery times.

“In our perception, Livros a Tempo Program had a great impact in decreasing the time of book delivery in the district. Our book delivery time has improved a lot. Books were delivered on time and before the school year started.” – Ana Mari Americo, Larde District Officer Director

Did the books get to schools this year before last year?

The RBF incentivized early book delivery by requiring that books be delivered to follower schools by the end of February in order to win an award.

In Nampula, the delivery timing increased across almost all categories of follower schools. For follower schools whose ZIP built or repaired storage, books were delivered 9 days later than last school year. Last year, books arrived in January and this year books arrived later in January or early February. Follower schools whose ZIP did not compete or does not have storage both experienced significant delays in delivery, an average of 24 – 31 days later than last year. Follower schools whose ZIPs already had book storage were the only category where books were delivered earlier than last year.

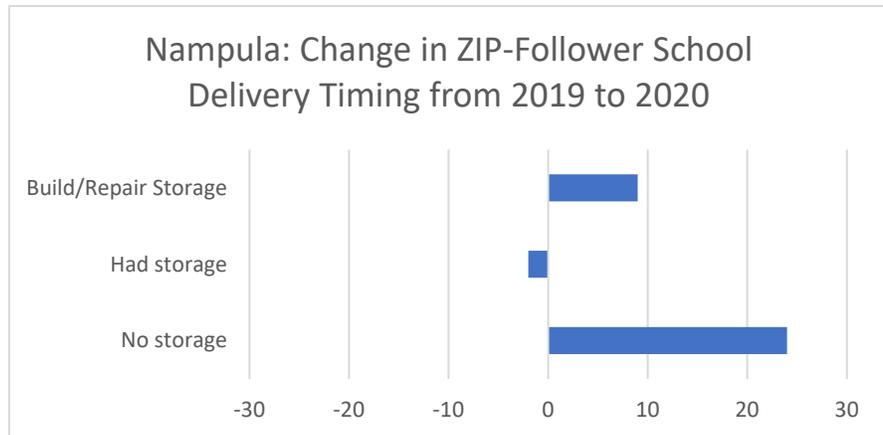


Figure 28: Change in ZIP-Follower School Delivery Timing from 2019 to 2020 in Nampula

In Zambezia, the difference in book delivery dates

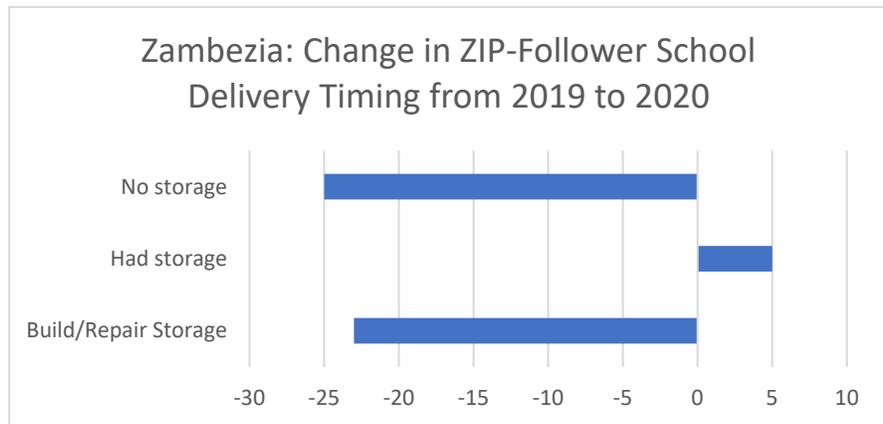


Figure 29: Change in ZIP-Follower School Delivery Timing from 2019 to 2020 in Zambezia

varied across categories. For both follower schools whose ZIPs built or repaired storage and those whose ZIPs have no storage, books arrived earlier than last year by an average of 24 and 31 days respectively. Follower schools whose ZIPs already had storage experienced the biggest delays in book delivery this year, an average of 13 days. For those that did not compete, books arrived an average of 7 days later. This suggests that book storage was not the only factor that improved the book delivery timeline to some follower schools in Zambezia. Books arrived earlier at districts in Zambezia, possible leading to earlier delivery times further down the book delivery chain.

Did remoteness had anything to do with it?

In Nampula, delivery delays were shorter for follower schools in more remote ZIPs than the prior school year. The following graph illustrates the difference in time to delivery from the 2019 school year to this year. Many of the ZIPs that are located over 20 kilometers from the district reported that last year they

did not have waterproof book storage. All but three reported that they now have waterproof storage at their ZIP.

In Zambezia, books were delivered to most follower schools earlier this year than last school year. Follower schools in more remote ZIPs were more likely to have received books later this school year than last, but this was limited to a small portion of sampled schools.

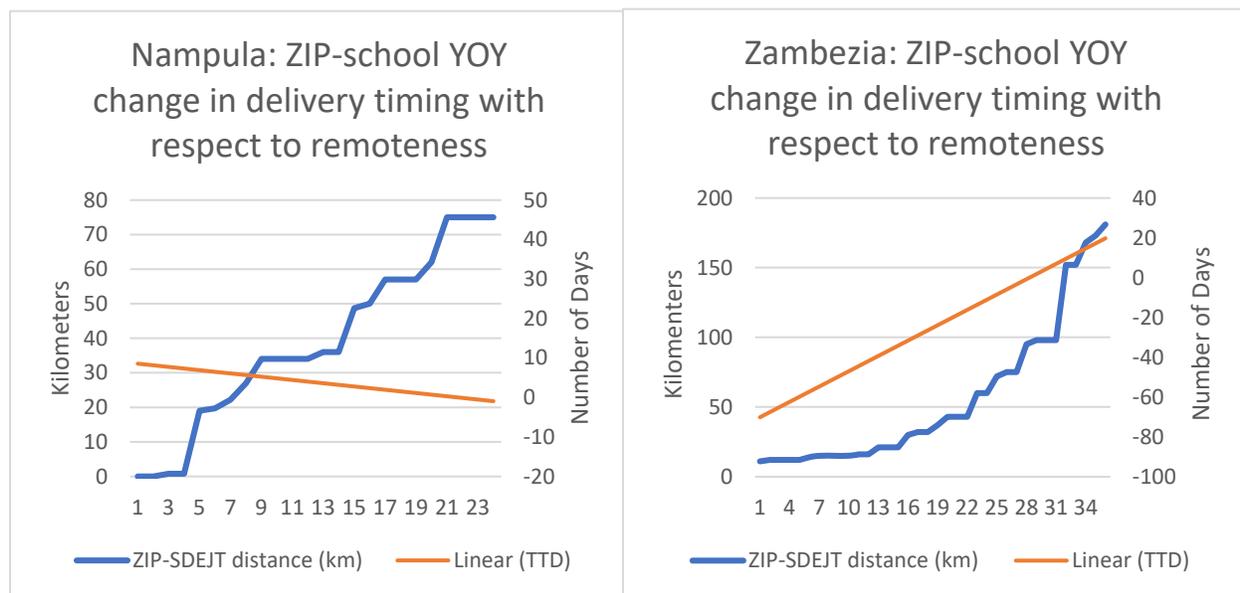


Figure 30: Distance and change in delivery dates from ZIP to Follower Schools Year over Year (YOY) from 2019 to 2020 in Nampula (left) and in Zambezia (right)

What can we surmise from the book delivery results?

On one hand there were improvements in time to delivery in Zambezia from districts to ZIPs and ZIPs to follower schools, it is unclear if the RBF led to it. Time to delivery decreased significantly for ZIPs in Zambezia that built or repaired storage, but also decreased for those with no storage. The reduction could be in part due to the RBF intervention or other factors, like improved communication between districts and ZIPs, better delivery logistics, differing weather conditions or less obstacles than the previous school year. At the same time, there were more delays in time to delivery in Nampula from districts to ZIPs to schools than last year suggesting that waterproof storage and the district RBF did not improve delivery times or allow books to be delivered before the rainy season this school year in Nampula. In future years, this could change, with districts responding to the newly constructed storage and the option to deliver books before the rainy season.

“The RBF competition was a great catalyzer for districts to deliver books on time. Previously books would remain 2 to 3 months without being delivered to ZIPs and schools.” – Essumaila Selimane, Angoche District Office Director

Given the results, we can surmise that book storage can have many benefits in book distribution but is unlikely a strong factor in impacting book delivery timing, unless potentially there are other pre-requisites before it can play a significant role. Based on our experience implementing Livros a Tempo and studying the book chain, we theorize that availability of funds to districts to procure transportation in time may be a pre-requisite before the availability of ZIP book storage impacts book delivery timing.

“Book delivery in multiple shipments constitute a great challenge and poses additional workload to budget limitations. We have serious problems in transportation for book delivery. By November and even December, the budget is not yet available to ensure books are delivered to ZIPs and schools... should advocate to the MINEDH that there is a budget for book delivery within the districts and this should be available early in October, November and December, which is the period for book delivery, otherwise books will always be delivered late to schools.” – Essumaila Selimane, Angoche District Office Director

For future programming, considering that the average time for books to get from districts to ZIPs is around two weeks, and ZIPs down to schools is a couple days, and with increased ZIP storage availability now, the key to improving the availability of books on time is likely more so in helping districts have the book distribution budget when needed to quickly procure transportation services. Future RBFs should consider partial advanced liquidity for districts. Another challenge expressed by districts and observed by Livros a Tempo is the numerous shipments of books to districts. Given limited resources, districts minimize contracting transportation services and wait for multiple or all shipments before moving books down to ZIPs and schools. Changes upstream with MINEDH, printers and DINAME processes to reduce the number of shipments to districts, assuming they are not further delayed upstream as a result, may improve book delivery timing to schools.

2.1.3. Books per Pupil

- In Nampula, the BPP ratio improved (increased) for ZIPs and follower schools
- In Zambezia, BPP improved (increased) for most ZIPs and follower schools, except those that did not compete in the RBF intervention

Was there a change in books per pupil from last year to this school year?

Livros a Tempo compared the books per pupil ratio from this year and last year for both ZIPs and follower schools. Based on book delivery receipts and enrollment data for 154 schools in Nampula and Zambezia, the book to student ratio for Grade 1 in 2020 is roughly 1.35 in Nampula and .99 in Zambezia. For Grade 2, it is roughly 1.58 in Nampula and .97 in Zambezia.

In Nampula, books per pupil increased across all categories for ZIPs and follower schools. This chart breaks down the BPP comparison from 2019 to the 2020 school year across the four categories: schools with no storage, schools that had storage, schools that did not compete and schools that built or repaired storage. While it is not possible to show causality in this analysis, the existence of waterproof storage at the ZIP school does not seem to influence BPP at schools. Other factors, such as

communication challenges around book requisitions and poor recordkeeping, likely have a larger impact on the BPP ratio at schools. It is possible that district-level awards had an effect on improving BPP ratios through focus on better inventory, requisitions and record-keeping.

While it is not possible to show causality in this analysis, the existence of waterproof storage at the ZIP school does not seem to influence BPP at schools. Other factors, such as communication challenges around book requisitions and poor recordkeeping, likely have a larger impact on the BPP ratio at schools. It is possible that district-level awards had an effect on improving BPP ratios through focus on better inventory, requisitions and record-keeping.

In Zambezia, BPP improved for most ZIPs and follower schools, except those that did not compete. Again, while we cannot show causality, this analysis looks at BPP across the three categories of ZIPs that qualified to compete in the RBF.

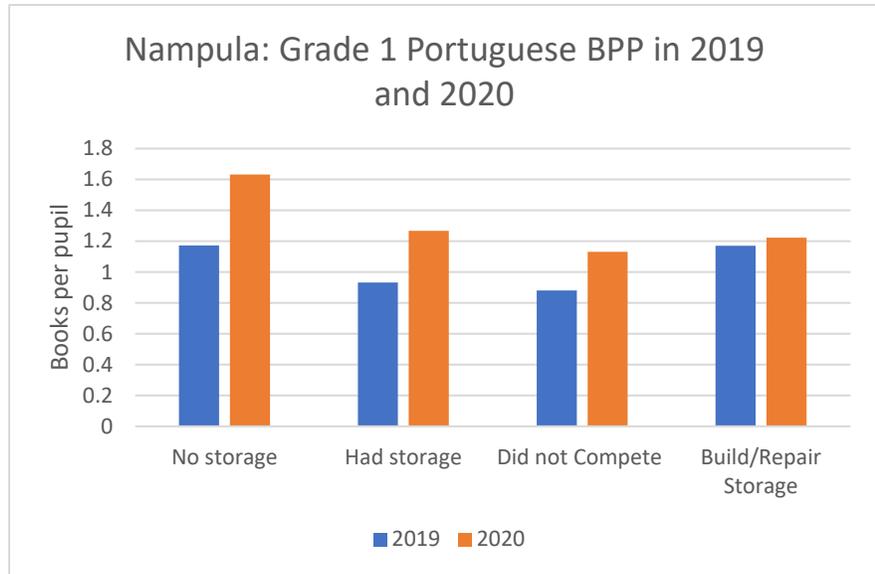


Figure 31: Grade 1 Portuguese BPP in 2019 and 2020 in Nampula

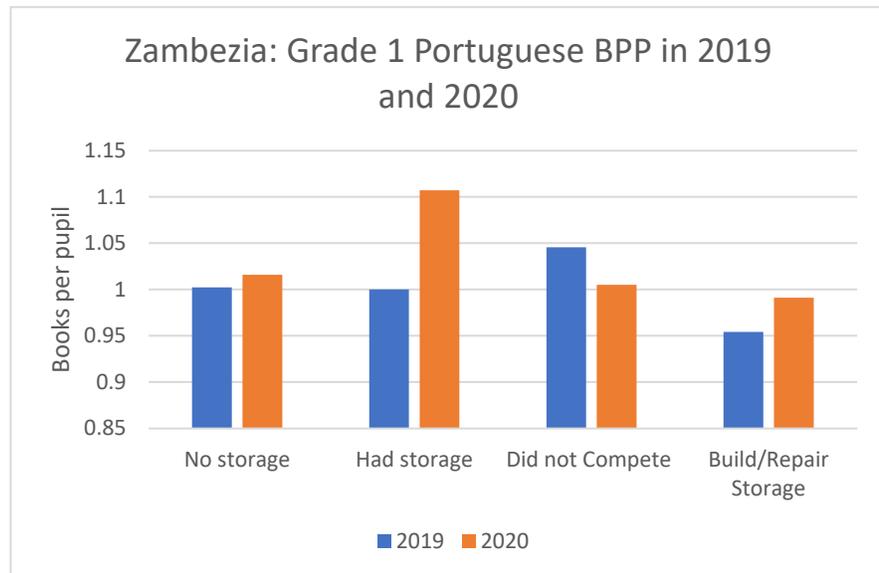


Figure 32: Grade 1 Portuguese BPP in 2019 and 2020 in Zambezia

2.1.4. Other Outcomes

- It is likely that ZIP book storage resulting from the RBF will reduce book damage
- Qualitatively, the Livros a Tempo RBF motivated districts and ZIPs to solve for challenges themselves, keep better book distribution records and data, and shed light on the roles and responsibilities in book distribution in the absence of clear policy guidelines

Reducing book damage: While the project did not measure damage to books or conditions of books and as such cannot speak to any improvements that might have come about from the storage, we can theorize that storage is likely to reduce damage to books.

“I am very grateful for Livros a Tempo Program for incentivizing the construction and/or repair of book storages at the ZIP level. Before the construction of this Namalala book storage, 70% of the schoolbooks were damaged.” – Ana Berta, Namilapa ZIP Coordinator, Mogincual District

“Book storage construction had impact on book conservation within the ZIPs. The number of damaged books reduced drastically.” – Agnel Mandice, Acting Luabo District Office Director

Motivating self-reliance and innovation: In debriefing with district office directors and ZIP coordinators after making out the payments for the RBF awards, they reflected that one of their biggest takeaways from the project was their self-learning that they could solve problems with existing local resources. Even though Result Based Financing was a relatively new approach for the Livros a Tempo target districts, ZIPs and schools, it helped boost ownership, cooperation, and the spirit of initiative among education stakeholders.

“The project raised our awareness to the point that we were able to perceive that using our local available resources & community assets, we can construct book storages.” – Salado Juma, Pebane District Office Director

“The great lesson learnt was how to deliver results without any input, advance or payment made in advance.” – Maria Noventa, Nacala-a-Velha District Office Director

“It is possible after all to make difference using our own locally available resources.” – Gracinda Venancio, Mogincual District Office Director

Livros a Tempo inspired many locally generations solutions through design and implementation. For instance, one of the participants from the RBF co-design after the design session wrote up specifications for a potential system for digital management of book delivery receipts and book inventories for ZIPs.

Improving recordkeeping: While districts did provide requested book receipt and administrative data, it was spotty, took several weeks of requests, and was not provided on time. The Livros a Tempo RBF relied on receipt records, which led to districts and ZIPs particularly recognizing the need to improve recordkeeping. Many ZIPs and schools reported adopting new practices for better organization and filing of paper receipts of book delivery and registers of book distribution to students.

“We have learnt a lot from Livros a Tempo: we learnt how to improve of book delivery monitoring process, documentation, and data management.” – Armando Nicane, Liupo District Director

Clarifying roles and responsibilities: Through the process of co-design that brought the MINEDH and provincial staff to engage with district directors and book technicians, as well as the implementation of the RBF that singled out key stakeholders in ZIP coordinators and district directors for awards for outputs that they ought to be responsible for, there was more clarity on the roles and responsibilities in

the book chain, particularly district down to schools. There is further need for policy dialogue with the MINEDH and publication of clear guidelines including book distribution responsibilities and timing, particularly upstream.

2.1.5. Use of RBF Payments

- ZIP Coordinators were able to mobilize community resources and are responsibly using the RBF payments to pay back loans and for school improvement projects
- Some ZIP Coordinators are sharing RBF payments with other ZIPs that constructed storage but didn't win the RBF competition
- District director payments, while likely unnecessary for achieving the RBF results, are being shared with district book technicians

In studying the Livros a Tempo RBF it is our determination that ZIP coordinators were instrumental in the process of building storage and book distribution from ZIPs to schools. Direct RBF awards to them are viable for future RBFs. While our RBF did not include conditions on how to use award funds, they report that they intend to use the money from the RBF award to improve or expand the warehouse and its continued maintenance. Paying back loans is first for those who borrowed to build storage. Some wish to use it for other school improvement such as building more classrooms, a library, water well, latrines, school fence or toward uniforms, or to share the money with the teachers. Some of the ZIPs that did not win the RBF award had taken out loans to build storage, a situation we had not contemplated. These ZIPs were figuring out how to pay it back, and we were pleased to learn that some of the ZIPs that received RBF awards were sharing it with these ZIPs. If the same RBF is implemented again, we recommend awards to all those who meet the conditions, or an additional lesser incentive to those who compete and meet the conditions but do not win.

"The ZIPs that won incentives shared part of their incentive with those who competed but did not win. We as district shared part of the incentive with planning technicians, those who are responsible for book delivery."
– Gracinda Venancio, Mogincual District Office Director

While the ZIP-level awards had a positive impact on book storage and perhaps on book distribution and book availability to students, Livros a Tempo found that district awards were likely unnecessary to accomplishing the program's goals. The role of districts was to inform and encourage the ZIP coordinators as they built or repaired book storage and worked to fulfill the other requirements of the program, to get books from districts to ZIPs in time, and to provide administrative data needed for the implementation and evaluation. Almost no ZIPs reported contributions from districts to the process of building book storage. As for communication and encouragement, only 3.94% of ZIPs reported they were participating in the RBF because they were following instructions given by the district. Only one ZIP responded that pressure from the district was a motivating factor for book storage construction. Furthermore, book delivery from districts to ZIPs did not improve from last year to this year in Nampula.

District directors have used the RBF award money to cover logistics costs incurred by the district office for supervision visits to ZIPs and schools, and have also shared it with planning technicians at the district

responsible for book delivery to motivate them. It is our experience that district directors still play an important role in providing the aegis for the RBF implementation via access to district book technicians and ZIP coordinators, and for collecting data at ZIPs and schools in the district and at the district office. District offices are responsible for book distribution down from the districts to schools. As such, we recommend further exploration or experimentation of RBF at a district level for book distribution, perhaps to district book technicians, other types of incentives and non-individual incentives.

2.2. Return on Investment Analysis

- The average cost of storage construction or repair was MZN 39,138 (roughly USD 530)
- Every dollar of RBF investment in ZIP storage construction or repair was matched 127% by school communities
- ROI can be improved by ZIP awards of around USD 500 instead of USD 700

The primary goal of Return on Investment (ROI) analysis is to determine the relative effectiveness of programs in achieving outcomes set out at the outset of the program. To capture ROI for Livros a Tempo, the following items were considered key outcomes for the RBF program:

- Change in waterproof storage availability at ZIPs
- Change in books per pupil for Grade 1, Grade 2, and Grade 5 Portuguese and Math subjects
- Change in delivery timing in 2020 compared to 2019

Average cost for the ROI formula was determined by adding reported costs for materials, labor costs and other expenses at ZIP leader schools on construction or repair of waterproof storage facilities. Labor cost was calculated by multiplying the total number of people employed to construct or pair storage by the daily rate by the total number of days worked. Volunteer labor was often used and is not included in the calculations. There were a couple outliers in the data likely attributable to data entry errors; these ZIPs reporting construction or repair costs of over 10 times the average without them were removed from the average cost analysis. Livros a Tempo used the average amount spent by ZIPs to determine the ROI for each outcome, as opposed to the RBF award amount for understanding social returns from public and community investment. For analysis at the follower school level, the cost reported at ZIP leader schools was divided by the total number of follower schools in each ZIP. Thus, average cost is dependent on the level of analysis employed.

Average change in benefit is the change in each outcome indicator of interest from 2019 to 2020. It is important to note that because of this difference, negative and positive values for this ROI ratio must be considered carefully. For example, a negative value for BPP would indicate that the books per pupil ratio has decreased, while there was a cost associated with this outcome. On the other hand, a negative value for the delivery timing indicator is a favorable result, as the program aimed to shorten the delay in textbook delivery year-to-year. Return of investment is:

$$\frac{\textit{Average Cost}}{\textit{Average Change in Benefit}}$$

2.2.1. Storage Construction ROI

The direct outcome of Livros a Tempo was construction or repair of waterproof storage at the ZIP level to improve the upkeep of books being shipped by districts to ZIPs, and further from ZIPs to schools, particularly given heavy rains and cyclones in Mozambique. ZIPs were asked to report whether they had waterproof storage in 2019 and in 2020. Across all ZIPs, there was an increase in waterproof storage from 2019 to 2020 from 29% reporting storage in 2019 to 81.5% in 2020. The estimated cost to achieve construction or repair to book storage at a ZIP was on average MZN 39,138, and costs were fairly similar in Nampula and Zambezia. Given that the change in benefit is binary in going from not having to having waterproof storage in good condition, the ROI at ZIPs is the average cost to build or repair storage. In other words, a ZIP level investment of MZN 39,138 can lead to storage availability, and as determined through Livros a Tempo, ZIPs are able to invest this capital upfront without advanced payment making it suitable for results-based financing.

Nampula	39,608
Zambezia	38,635
Total	39,138

Livros a Tempo also looked at the total community investment in the construction or repair of book storage units compared to Livros a Tempo's investment via the total RBF payout. Average community investment multiple for RBF is:

$$\frac{\textit{Total Construction Spending}}{\textit{Total RBF Payout Amount}}$$

There were 20 ZIP awards committed by Livros a Tempo via the RBF, but 58 ZIPs built or repaired storage. The total investment by the ZIPs who built or repaired storage, not just the RBF winners, was MZN 2,270,004, and the total RBF payout amount to ZIPs was MZN 1,000,000, meaning that community investment was over 2.27 times the amount Livros a Tempo provided as incentives to build or repair storage. District-level RBF awards are not used in this analysis since the program found that district-level awards were largely unnecessary for successful implementation of the RBF and according to survey results, districts provided little financial or other support to ZIPs as they were constructing storage. For every dollar Livros a Tempo put into RBF awards for storage construction or repair, the communities matched 127% by putting in \$2.27. In other words, every dollar the project put towards the RBF, the community investment was an additional \$1.27, indicating that using RBF is a multiplier for development investment.

Further, it is our understanding that similar outcomes in book storage construction or repair can be achieved by an RBF award of less than the MZN 50,000. In discussions with ZIPs, we estimate that a RBF award of roughly USD 500 (MZN 36,750) is likely to have the same effects, which tracks closely with the average cost incurred by ZIPs. RBF awards of that amount will lead to increased ROI than reported here.

2.2.2. Books Per Pupil ROI

An important indicator for book supply is the Books per Pupil (BPP) ratio. While the bounds of this ratio are not limited, one can imagine that it is favorable to have at least 1 book per student for each subject in each grade. By nature of the data reported here, the ROI ratio for this indicator will assess the investment needed to achieve additional coverage of one book per child. Please note, due to the nature of the sample and the sample size, this analysis cannot make any causal inferences, so in reality, this investment may not hold. This analysis uses the BPP for follower schools within ZIPs that built or repaired storage, but ZIP school BPP is not used in this analysis. Average change in books per pupil is:

$$\frac{(Total\ Books_{2020})}{(Enrollment_{2020})} - \frac{(Total\ Books_{2019})}{(Enrollment_{2019})}$$

	Grade 1 Portuguese BPP	Grade 1 Math BPP	Grade 2 Portuguese BPP	Grade 2 Math BPP	Grade 5 Portuguese BPP	Grade 5 Math BPP
Nampula	31,691	31,204	50,725	50,725	84,135	94,471
Zambezia	-161,312	-149,961	-557,476	314,117	-348,981	-197,054
Total	94,443	94,847	128,394	94,363	271,075	537,141

BPP analysis shows positive results for all grades and subjects in Nampula and at an aggregate level and negative results in Zambezia for all grades and subjects except Grade 2 Math BPP. The values in Table 2 represent the expected cost of achieving an increase in the BPP ratio of 100% (i.e. giving each child in a school an additional book). This may not be necessary, and is likely unrealistic, and thus these ratios can be adjusted to any percentage increase in books per pupil. For instance, we find that for a 50% increase in Grade 2 books per pupil in Nampula may come about from an investment of MZN 23,672 [i.e. MZN 47,344/2] per school. A roughly \$100 (USD) investment per school in Nampula may improve BPP by 25% for Grade 1 books. An investment of MZN 50,000 per school may see about a 50% improvement in BPP for Grade 1 books and Grade 2 Math books at an aggregate level.

2.2.3. Change in Delivery Timing ROI

Delivery timing of books from districts to ZIPs and from ZIPs to follower schools is important to ensure that students do not go without books early in the school year. Livros a Tempo aimed to incentivize construction and repair of storage facilities at the ZIP level with the goal of increasing storage capacity for books, reducing the risk of water damage to books once they reach ZIPs, and therefore allowing for earlier provision of books to ZIPs and schools. Calculation of delivery time was done by comparing the dates of delivery in 2020 with the dates of delivery for books in 2019 across the district to ZIP and ZIP to follower school supply chains for ZIPs that built or repaired storage. Like BPP ROI, this analysis cannot make any causal inferences, so in reality, this investment may not hold. Average change in delivery timing is:

$$(Delivery\ Date_{2020} - Delivery\ Date_{2019})$$

	Average Difference in Delivery Dates (District to ZIP)	ZIP ROI (District to ZIP)	Average Difference in Delivery Dates (ZIP to Follower School)	Follower School ROI (ZIP to Follower School)
Nampula	12	3,301	9	786
Zambezia	-21	-1,840	-24	-350
Total	-5	-7,828	-8	-959

Table 3 provides the results for ROI analysis of change in delivery timing for ZIPs that built or repaired storage and their follower schools in Nampula and Zambezia. Books in Nampula arrived at ZIPs 12 days later than last year. There were improvements in delivery timing in Zambezia with books arriving on average 21 days earlier than last year. The average cost of construction or repair in Zambezia was MZN 38,635 indicating a ROI of a one-day improvement in delivery to a ZIP in Zambezia for MZN 1,840 (\$25.53). Overall, from district to ZIP, there was an aggregate ROI of MZN 7,828 per ZIP for a one-day improvement in delivery. In other words, an investment of about MZN 39,140 per ZIP at the aggregate level may improve delivery timing from districts to ZIPs by five days.

Books arrived at follower schools in Nampula on average nine days later than last year. In Zambezia, books arrived at follower schools on average 24 days earlier than last school year, indicating a ROI of a one-day improvement in delivery to follower schools in Zambezia for MZN 350 (\$4.86). In other words, \$34 investment per follower school in Zambezia may improve book delivery timing to the school by a week. At the aggregate level, from ZIPs to follower schools, an investment of MZN 959 per school may improve delivery timing to the schools by a day.

3. Reflections from Livros a Tempo Implementation

The section includes reflections from implementing the Livros a Tempo project from the study and design, implementation and monitoring, to evaluation, as well as thoughts and recommendations for future programming around results-based financing and book delivery programs in Mozambique.

3.1. Study and Design

- The co-design provided a rare opportunity for MINEDH staff from Maputo and province centers to come together with district directors and technicians from remote districts
- In future programming, more participation from teachers, principals, ZIP coordinators and other stakeholders can make the solution design more creative

The Livros a Tempo project was designed as two separate projects in one. One was a contextual study that provided data on what is happening in the last mile and penultimate mile of the book chain. The other was implementing and evaluating an RBF in the book chain aimed at improving book availability to students. This approach provided opportunities but was also fraught with some challenges.

On the positive side, this approach allowed for a participatory, data-driven design process for the RBF. The study was a rare, detailed survey into the last and penultimate mile of book delivery to remote areas. It revealed differing and common challenges. Stakeholders in the book chain helped prioritize these revealed challenges and design the RBF intervention themselves, which empowered and built the capacity of MINEDH staff to design RBF solutions as opposed to foreign intervention design. We appreciate the World Bank's flexibility to allow for the intervention to be designed during the project, and to agree to the design that emerged from beneficiaries.



Figure 33: Photos from RBF co-design event with MINEDH, provincial and district offices, and book technicians in Nampula

The co-design provided a rare opportunity for MINEDH staff from Maputo and province centers to come together with district directors and technicians from the most remote districts in key target provinces for book distribution to hear their challenges and priorities, and design solutions with them. This was explicitly articulated by the head of the MINDEH Book and Didactic Materials Department who participated keenly in the co-design. The co-design led to several ideas and solutions, not only RBF

solutions, which was a value add to the participant districts and MINEDH and any future work in book distribution in Mozambique.

Bringing together all district directors and district book technicians for the co-design successfully led to buy-in and ownership in the RBF from all stakeholders. This was the intention because districts are responsible for book distribution from districts down to schools. This was key to allow for a smooth RBF implementation. However, some of the project-hired facilitators and translators in the co-design were teachers and they also contributed meaningfully to the co-design. This suggests that in future programming, more participation from teachers, principals, ZIP coordinators and other stakeholders can make the solution design more creative. We had shied away from this because of limits in size or number of participants for a high-quality co-design exercise, but perhaps multiple co-design workshops could be conducted.

The co-design led to an RBF on book storage that was nearly unanimously selected by the participants who posited it to have an impact on distribution. This RBF did not initially specifically tie financing for improved delivery timelines to schools or book availability to students, which was the primary interest of the World Bank. After back and forth over a few months, Livros a Tempo modified the RBF halfway through implementation and provided an additional explanatory deliverable. We recommend in the future when disbursement linked indicators are mostly set to begin with, to have RBF or solution co-design sessions structured to be limited to those parameters. We also recommend participation by the funder in co-design sessions to understand and influence the designed solution.

3.2. RBF Implementation and Monitoring

- For RBF conditions or requirements, it is important to balance being prescriptive and allowing for flexibility for locally relevant solutions
- In implementing a subnational RBF focused on a few segments of book distribution, it may not work to have hard dates for intermediate book delivery as distribution linked indicators
- For future similar or other RBFs, reduce conditions such as the onus of reporting that might disqualify potential awardees who meet the desired output
- Consider digital solutions for RBF implementation and monitoring such as mobile money for RBF payments and using satellite imagery to monitor construction

The government of Mozambique asked us to prioritize hard to reach schools in the most remote districts for the study and intervention, which led to some logistical challenges. For instance, it was difficult to access areas that experienced severe flooding for the contextual study. Mozambique was hit by severe cyclones namely Cyclone Idai and Kenneth in March and April 2019, and the study data collection was at the same time. Further, the designed RBF exclusively focused on the most remote ZIPs in these districts, which made remote RBF sensitization and data collection challenging, requiring more fields visits to the districts, ZIPs and schools than expected. For example, we planned for dissemination of information about the RBF via digital or telecommunication channels such as SMS, WhatsApp and phone calls. Limited response or engagement in these channels because of connectivity and other challenges led to

the project traveling to districts to meet district staff and ZIP coordinators in-person to acquaint them with the requirements of the RBF competition and address queries.

In setting the criteria for ZIPs that could qualify for the ZIP RBF award, the team wanted to incentivize remote ZIPs while attempting to have equity between districts and provinces. ZIPs indicated that there might be an imbalance in allocation of book storage awards since certain districts tend to have more concentrated populations and might have more storage units in proximity, such as Ile, while others may not be the furthest away but have difficult geographical landscapes, such as Luabo, Inhassunge and Angoche, including having some ZIPs on islands. Livros a Tempo qualified the 10 furthest ZIPs by distance from the district education office per district. While not perfect, it was altogether found acceptable and equitable to districts and most stakeholders, allowing for a simple qualification rule with no exceptions and transparent implementation of the RBF awards.

For the RBF award conditions, we also learned to walk a fine line between being prescriptive and allowing for flexibility for locally relevant solutions. For instance, for ZIP awards the storage had to be waterproof and have a minimum volume capacity, but we did not prescribe the materials to be used or dimensions. Communities used locally accessible construction materials and some built storage with low height since they are subject to heavy winds.

In implementing a subnational RBF focused on a few segments of book distribution, we learned that it does not necessarily work to have hard dates for intermediate book delivery as distribution linked indicators. We had posited that with storage construction completed in November 2019, books could get from districts down to ZIPs by December 2019 so they could be stored there through the rains, and as such had delivery of books to ZIPs by December as a condition. However, there was significant variance in when districts received books with books arriving after December 2019 for many districts. Delays upstream made it impossible to judge the effort of districts and ZIPs with a hard date they could not control, and we adjusted timeline RBF conditions accordingly.

Monitoring the RBF disbursement linked indicators, particularly storage construction and book delivery, was done using timestamped before and after photos of the storage and photos or scans of book delivery receipts. While sending photos and receipts were conditions for the RBF awards, it took multiple one-on-one requests before some photos or receipts were submitted remotely via Whatsapp. We did end up receiving the storage construction/repair photos successfully via Whatsapp, but not receipts which had to be collected through other means (see 3.3. RBF Evaluation). The photos were insightful in visually showcasing the work, gauging progress and number of storages built or repaired, and in validating the construction for the award.

To ensure that the storage photos were correctly validating construction in the provided timelines (participants were not just sending photos taken before the project), we also experimented with using satellite imagery for a few of the hardest to reach areas in case we were not able to visit during the final study. Livros a Tempo used satellite imagery to identify if new storage had been constructed.



Figure 34: Pre (left) and post (right) storage construction satellite images of Intxuquela ZIP in Pebane district in Zambia. Orange bounding box around waterproof storage with steel roof. (Sources: Bing Maps and Planet Labs)

The project engaged Planet Labs, a commercial company with the world’s largest constellation of Earth-imaging satellites, to take high resolution images of the ZIPs in December 2019. ZIPs were expected to complete constructing storage in November 2019. This satellite imagery was compared with publicly available lower resolution imagery (such as Google Maps or Apple Maps) that do not update satellite imagery base maps frequently and as such had imagery before construction. When the location of the constructed storage around the ZIP school was not clear, the photos provided by the ZIPs helped provide markers to locate the construction on the satellite imagery.

We were unsure that communities would be able to construct storage structures within six weeks but were pleasantly surprised. The litany of conditions for getting the RBF award such as sending photos of storage, book delivery receipts and other data points, disqualified many ZIPs from being considered viable for the RBF awards. We found that there were at least as many ZIPs that had built storage but not considered viable as there were viable ones. For future similar or other RBFs, we recommend reducing conditions such as the onus of reporting that might disqualify potential awardees who meet the desired outcome.

For distributing RBF payments to ZIP coordinator and district director awardees, we found it immensely expeditious and cost-effective to use mobile money. We recommend mobile money be used for future RBF individual incentives, particularly in remote areas.

Lastly, our Program Coordinator had to make district education offices regularly realize that Livros a Tempo was not a traditional donor funded and implemented project but instead a partner in facilitating improvement in the book chain via results-based financing. We were not going to hire and pay contractors to build storage and deliver books; instead, the districts and ZIPs themselves had to implement and monitor storage and distribution improvements, which qualified them for awards. It is suggested that in the future engaging in a Memorandum of Understanding with education offices and other stakeholders on roles and responsibilities at the onset might be helpful.

3.3. RBF Evaluation

- Future RBF programs should consider the generation of a counterfactual and larger sample size, as well as longer time period to measure outcomes
- Gathering receipts and enrollment data was challenging, but still allowed for studying the results of the program
- Despite the challenges presented by the COVID-19 pandemic, the program was able to adapt and conduct surveys remotely in Zambezia

One of the primary challenges in evaluating the Livros a Tempo approach was that the contextual study was never intended to be a baseline. This is because data cannot be collected on output and outcome indicators for an intervention that has not been designed since it was not known what the outputs would be. The contextual study was meant to primarily influence the RBF design. The first field study when the schools opened in 2019 was for the contextual study. The 2020 field study at the beginning of the school year was to evaluate the RBF. For a project of around a year and half, there was not sufficient time after designing the RBF to conduct a separate baseline data collection and implement the RBF in the subsequent year.

The grant amount limitations also did not allow for the generation of a counterfactual and larger sample. Given significant changes in the book supply chain year over year, we recommend counterfactuals for evaluating future book supply chain interventions. Further, there was not enough time to see changes in other long-term indicators such as enrollment, attendance and student learning several months into the school year. Yet, we came up with a meaningful study methodology.

The project depended on receipts and enrollment registers from 2019 to construct a baseline, and the same for 2020 to compare. We found that many ZIPs and schools did not have this information organized to be able to share even via photos. Despite the RBF award being contingent on this data provision, many ZIPs were disqualified because they could not show receipts. For the final study, we had to patch together data from enumerators themselves taking photos in-person, summarized records from districts, and some ZIPs providing digitized records. Using receipts and administrative data, while challenging, worked for evaluating Livros a Tempo and may work better in the future since it has inspired many districts, ZIPs and schools to keep better records.

The field final study in March-April 2020 was challenged by unexpected disruption from the COVID-19 pandemic. With schools closed to students, we could not sufficiently observe classes and interview students in Nampula. We had to call off all the focus group discussions a day before they began because of a ban on gatherings. We continued to still interview school principals, ZIP coordinators and district directors completing Nampula data collection until mobility was altogether restricted.

Then Mozambique declared a state of emergency and closed schools, meaning we could not collect data in person in Zambezia, which we had initially planned to collect after Nampula. Given our past challenges in engaging districts and ZIPs via phone we were skeptical about remote data collection. Many school principals had moved out of their communities to be closer to their family while schools were closed, making it difficult for them to capture receipt and enrollment records. However, we

successfully adapted, informed districts and ZIPs of the importance of the surveying and needing to complete it before disbursing payments, and our enumerators were able to interview district directors, ZIP coordinators and school principals over long phone calls using the same instruments as in-person data collection. The pandemic introduced delays in completing data collection and subsequent data analysis, but we are glad to have been able to adapt and complete it under the circumstances.

Since the final study has shown conclusive and cost-effective impact on storage availability but inconclusive impact on improving book delivery timing and book availability, it exposes opportunities and challenges of a sub-national RBF focused on segments of the book chain. Apart from the study limitations, some of this may be attributable to the fact that despite having two RBFs awards (for ZIPs and districts, with the latter that we believed to be focused on improving book delivery timing) and including distribution conditions in both, the RBF awards were primarily perceived to be around promoting storage repair or construction and its link with book distribution. This leaves the opportunity to further test an RBF at the district level focused solely on book availability outcomes for students and schools.

Conclusion

Through the contextual study, design and implementation of the RBF, and the final study, Livros a Tempo learned about various areas for improvement in the book chain between districts and schools, some of where RBF can be potentially applied. The final study found that the implemented Livros a Tempo RBF competition had a direct and significant positive impact on the construction and repair of book storage throughout Nampula and Zambezia by directly motivating ZIP coordinators to mobilize funds and resources in their communities. There were mixed results in changes to books per pupil and book delivery timing to ZIPs and schools, and even though at the aggregate level these improved, causal inferences between this and the intervention cannot be made. In conclusion, Livros a Tempo recommends further programming in Mozambique in piloting a distribution RBF program and scaling the successful book construction and repair RBF program.

Pilot an RBF program focused on distribution or improving books per pupil

Given that storage at the ZIP level has been improved in remote districts in Nampula and Zambezia, there is an opportunity to turn to perhaps a less prescriptive but more direct RBF to improve book delivery timing or books per pupil in these districts. While the RBF rules for Livros a Tempo incentivized timely book delivery, the main focus was the construction or repair of storage units and that seems to be where ZIPs focused. We recommend piloting an RBF intervention that more directly incentivizes early book delivery, and perhaps solves for the paucity of timely budget availability for transportation procurement for districts, a bottleneck that we have suggested is a key barrier. We also recommend considering incentives upstream for reducing the number of shipments to districts without delaying book provision to districts.

Livros a Tempo found that there are certain ZIPs and schools with low books per pupil, and similarly many more can be identified. The project has already socialized districts, ZIPs and schools around expectations for an RBF program. An RBF could now be targeted to districts to improve BPP at schools with low BPP, leaving it up to the district technicians and others to determine how best to improve that.

Implement a national RBF program aimed at improving storage

Since Livros a Tempo's RBF program was successful in increasing book storage at remote ZIPs, a country-wide RBF incentive program would likely lead to an increase in storage throughout the country. Given that Nampula and Zambezia are the most populous provinces, there might even be more need for storage in other parts of the country.

Further, even for ZIPs that built storage via Livros a Tempo, there is need for some continued funding or an RBF award around repair or construction every few years for storage upkeep. When ZIPs were asked about the RBF during the survey, nearly all ZIPs (98.4%) responded that the initiative should continue. When asked about maintaining book storage, the majority of ZIPs (55.3%) responded that they would need some support to maintain the storage.

For a national RBF program to incentivize storage construction, we recommend a few modifications of the RBF. Livros a Tempo found that district-level awards were largely unnecessary for successful implementation of the RBF program and can be skipped for a program aimed at ZIP and school storage improvements. Since the program was targeting book storage construction at the ZIP-level, ZIP coordinators had to do the majority of the work to successfully compete, including mobilizing school and community resources to construct storage and submitting photos of progress and completed storage, as well as submitting book receipts and enrollment data. ZIP Coordinators also likely had more buy-in because they can directly observe the impact of constructing storage units.

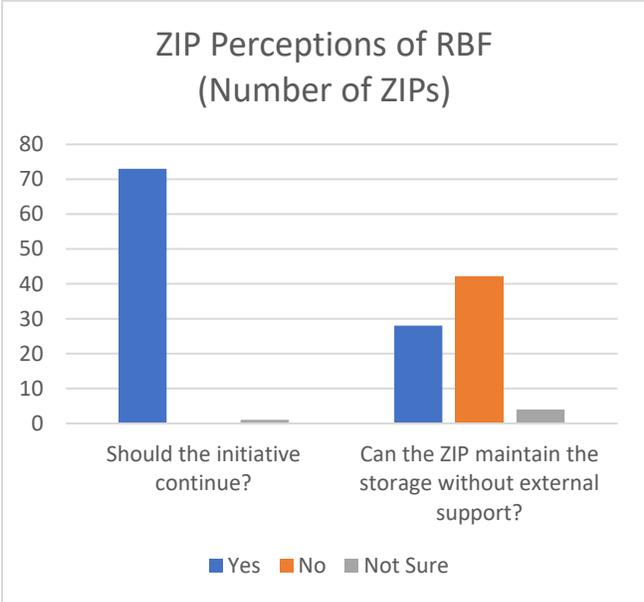


Figure 35: ZIP perceptions of the Livros a Tempo RBF intervention

Similarly, while the Livros a Tempo competition resulted in nearly three times as many ZIPs building or repairing storage as there were awards, at a national level we would recommend potentially giving awards of lesser amounts, up to USD 500, to all ZIPs that successfully participate in storage construction or repair, removing the competition for a limited number of awards, but maintaining limited time to construct and avail the awards. We observed that competition among ZIPs was not necessarily a motivator, and awards for all who meet the requirements could provide additional incentives for ZIPs or schools to participate if there was a guaranteed reward upon successfully completion.

Consider analogous RBF programs

We would also like to encourage consideration of whether an RBF such as the one designed and implemented in Livros a Tempo can be used in analogous domains in or beyond education. For instance, there is a need for more classrooms to reduce the number of students in a class for safer schooling during the COVID-19 pandemic. Just as schools and ZIP communities came together to successfully construct book storage, it is fathomable that they could be similarly incentivized to build more classrooms with a RBF program.

Appendix 1: Glossary/Acronyms

BPP	Books Per Pupil
DINAME	National Supplier of School Materials – Logistics company hired by MINEDHD
MINEDH	Ministry of Education and Human Development
MZN	Mozambican metical currency (plural: meticaais) 1 MZN = 0.014 United States Dollar (November 2020)
RBF	Results Based Financing
ROI	Return On Investment
SDEJT	District Directorate of Education
SMS	Short Messaging Service
TTD	Time To Delivery
USD	United States Dollar (\$)
YOY	Year Over Year
ZIP	Zone of Pedagogical Influence (school cluster)

Appendix 2: Final Study Methodology

Livros a Tempo integrated quantitative and qualitative approaches and analyses when conducting this final study. This method allowed the team to maximize the potential for explanation and interpretation of final study findings.

The final study collected data from leader and follower schools in the project's target ZIPs in Nampula. Using data collected from the survey, the project examined the construction of book storage at the ZIP level as well as the timely availability of books at the primary school level. During the survey, enumerators collected photos of book delivery receipts for the 2019 and 2020 school years, focusing on Reading (Portuguese) and Mathematics textbooks for Grades 1, 2 and 5. In addition to book receipts, this study was also based on the recollection of interviewees and spot checks in classrooms. The timing of book delivery for the current school year was compared to last year and those findings are outlined in this report.

Study Limitations

Livros a Tempo did not have a baseline survey for this study because the intervention was designed after the contextual study. The baseline was constructed using receipts and administrative information from the previous years. Therefore, for the purpose of this final study, Livros a Tempo created a baseline with book delivery receipts from 2019. Despite this, due to the limited sample of ZIPs that have book storage or did not compete in the RBF, the survey did not include a valid control group to estimate causal impact. Therefore, no causal relationship can be shown between book delivery timing and the project's intervention. The report still provides insight on average dates books arrived at schools compared to last year and the average time to delivery from district to ZIP to follower school.

Due to the COVID-19 pandemic, Mozambique declared a State of Emergency in April, closing schools and limiting gatherings. Thus, enumerators were not able to hold any Focus Group Discussions (FGDs) or travel to Zambezia to conduct the survey in person. Instead, the project collected data from Zambezia remotely. There were some limitations to the remote data collection – no in-person inspection of book storage and ZIPs had to submit receipts and enrollment data remotely. While in-person survey collection is ideal for this type of study, Livros a Tempo was able to collect a significant amount of data remotely and this report includes analysis of both provinces.

Sampling Strategy

The project used a two-stage sample design. The sample draws from leader (ZIP) and follower schools in the target districts in Zambezia and Nampula. The survey was conducted in all twelve of the districts where Livros a Tempo implemented the RBF program – a total of 201 schools were surveyed for the final study.

For the first stage of sampling, Livros a Tempo selected random samples within the following categories of ZIPs. Please note, the RBF competition was only open to the ten furthest ZIPs from the district offices in each; these ZIPs are referred to as “Qualified ZIPs” throughout the final reporting. Livros a Tempo only sampled from these ZIPs in each district.

- **ZIPs that competed in the RBF, but were not viable to win:** ZIPs that entered the RBF competition, but did not successfully follow the rules (did not send all photos, submitted photos late, etc.)
- **ZIPs that competed and were viable to win:** ZIPs that successfully met the requirements of the RBF rules. This includes:
 - ZIPs that competed, were viable to win, and won
 - ZIPs that competed, were viable to win, and lost
- **ZIPs that did not compete:** ZIPs that did not submit photos of book storage. Please note that though these ZIPs did not submit photos to Livros a Tempo the survey revealed that many reported they had constructed and repaired book storage and therefore they are considered in this analysis of the RBF program.

Livros a Tempo conducted the final survey in a sample of ZIPs from each of these categories. ZIPs were divided into categories to better evaluate the effects and uptake of the RBF intervention in target districts. The following table includes the actual sample size of ZIPs for the final study (columns highlighted in grey). A total of 75 ZIPs were included in the final study survey.

Province	Total # Qualified ZIPs	Total # ZIPs that competed ¹	# ZIPs that competed but were not viable to win	Sample: # ZIPs competed, not viable	# ZIPs that competed and viable to win	Sample Size: # ZIPs competed, viable	# ZIPs that did not compete	Sample: # ZIPs did not compete
Nampula	45	38	20	12	18	18	7	6
Zambezia	58	20	11	11	9	7	38	21
Total	103	58	31	23	27	25	45	27

At the second stage of sampling, Livros a Tempo randomly selected follower schools from two groups: follower schools in ZIPs that competed and follower schools in ZIPs that did not compete. While follower schools did not directly compete in the RBF competition, Livros a Tempo is interested in the RBF’s effects in the last mile of book delivery, thus analysis of follower schools was included in final report.

¹ More ZIPs competed in the RBF/constructed storage than originally reported.

The sampling employed a systematic random sampling technique. Given that ZIPs include several follower schools, Livros a Tempo randomly selected follower schools within each of the groups to ensure a balance of respondent coverage and geographic spread. A total of 126 follower schools were visited or remotely surveyed during the final study.

Province	Total # Follower Schools in Qualified ZIPs	# Follower Schools in ZIPs that competed	Sample: # Follower Schools in ZIPs that Completed	# Follower Schools in ZIPs that did not compete	Sample: # Follower Schools in ZIPs did not compete
Nampula	218	178	41	40	20
Zambezia	200	77	29	114	36
Total	418	255	70	154	56

Survey Design

Livros a Tempo conducted a review of the survey instrument used during the contextual study and updated it to primarily assess the validity and efficiency of the RBF incentive program. The surveys for districts, ZIPs, and follower schools included practical questions about the timing of book delivery this year, administrative information about the schools, information about book storage, book distribution, inventory and the RBF intervention:

1. **District Survey:** District book technicians and district directors were surveyed. The questionnaire included questions regarding the timing and logistics for book delivery, inventory, and the RBF solution. A total of 20 district surveys were completed.
2. **Leader School Survey:** ZIP coordinators were surveyed about the timing of book delivery, administrative information, book storage, the RBF intervention, book distribution and inventory. ZIP storage units were also be inspected. A total of 76 leader school surveys were completed.
3. **Follower School Survey:** Follower school principals were asked about the timing of book delivery, book storage, the RBF intervention, book distribution and inventory. A total of 126 follower school surveys were completed.
4. **Classrooms:** The enumerators conducted spot checks in classrooms to get a real sense of the ratio of students to books. Within each school included in the sample, a small sample of 10 students were asked about book availability. Please note, Mozambique closed schools since April 2020 due to the COVID-19 pandemic, so few student surveys were completed. A total of 54 classroom surveys were completed.