



[Give Well Report]
Kenya

September 2017

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EXECUTIVE SUMMARY

Following two highly successful randomized control trials (RCTs) between 2007 and 2013, which showed that PSVs in which *Zusha!* stickers were placed had between 25-50% fewer insurance accident claims generating accidents, Georgetown received funding from USAID to scale up the *Zusha!* intervention nationwide in Kenya. No longer run as a controlled experiment, the intervention aims to reliably and consistently reach every PSV in the country – estimated to be between 50,000 and 60,000 vehicles. Launched in May of 2015, the *Zusha!* scale-up has now distributed 104,730 complete sets of stickers to 51,276 unique vehicles.

The initiative is implemented in close partnership with both government bodies and private organizations. Over the course of the scale-up, *Zusha!* has received both in-kind and financial support from the National Road Safety Trust (NRST), the National Transport and Safety Authority (NTSA), Safaricom, General Motors (GM), and Directline Assurance (DLA).

Both DLA and the NTSA serve as distribution points at each of their combined 34 sites across the country. Directline Assurance has been a vital partner since the research trial phase. In addition to running and funding a lottery to boost compliance, they also continue to provide data on sticker issues, insurance policy purchases, and accident claims from their database.

A particularly close partnership has also been established with the NTSA, which has fully endorsed *Zusha!*. The Authority has worked to facilitate sticker distribution and compliance checks by *Zusha!* staff, and launched an intensive promotional marketing campaign. The NTSA leadership is currently considering a proposal to further integrate *Zusha!* into their operations and incorporate sticker distribution and compliance data collection into their new digital platform used during annual inspections.

Compliance as measured by the three lottery periods (during which 299 vehicles were drawn) has averaged 76% among all eligible vehicles, and 86% among vehicles which actually completed inspections. Given that stickers issued by DLA, the largest distribution channel, are not placed directly inside vehicles, this number is suspected of being artificially high, and indicative of a moderate level of gaming of the lottery. We therefore conducted two rounds of independent, direct compliance checks in PSV parks across the country, ultimately surveying 20,770 vehicles. Of these vehicles, an average of 22.4% were found to be fully compliant, though more than half were partially compliant.

Though *Zusha!* in Kenya is no longer being implemented as an RCT, because of logistical anomalies, a sufficient number of vehicles were observed as not receiving stickers through DLA during distribution periods to conduct a quasi-experimental comparison group. A generalized difference-in-differences strategy was therefore employed to estimate the impact of the scale-up. When focusing on the first Phase of distribution, vehicles that received stickers tended to experience fewer accidents than those that did not, but this difference was present both before and after the intervention. Over the period during which the sample is reasonably well balanced, the difference in accident rates is somewhat smaller in the six months before than in the six months after, consistent with the stickers being associated with a reduction in claims.

I. INTRODUCTION

Road accidents continue to be one of the major causes of deaths and injuries in Kenya. The WHO reports that the annual rate of road deaths in Kenya, at 29.1 per 100,000 individuals, is the 15th highest in the world. Such loss of life and associated injuries have enormous socio-economic impact on families, communities, and the nation at large.

The government of Kenya has employed various strategies to curb the loss of life and injuries caused by road accidents. An early example was what has now come to be known as the ‘Michuki rules’ focused on PSV safety, which came into effect in February 2004. Most of the rules however were either not strictly enforced or were, like the speed governor switch, easily circumvented. Despite popular expectations of the Michuki rules, PSV crashes continued at alarming rates.

As part of the continued efforts by the government to enforce safety on Kenyan roads, the National Transport and Safety Authority (NTSA) was established in 2012 with the mandate to manage and advocate for national transport and road safety. NTSA’s core functions are to advise and make recommendations to the Cabinet secretary on matters related to road transport and safety; implement policies relating to transport and safety; plan, manage and regulate the road transport system; as well as ensure safe, reliable, and efficient road transport services.

Working in close partnership with the NTSA and the private insurance company Directline Assurance (DLA), *gui2de* launched the nationwide scale up of *Zusha!* in Kenya in May 2015. The scale up followed two highly successful randomized control trials (RCTs) conducted between 2007 and 2013, which showed that PSVs in which *Zusha!* stickers were placed had between 25-50% fewer insurance claims generating accidents. To date, approximately 104,730 full sets of stickers (plus over 6,000 partial replacement sets) have been issued as part of the scale-up, reaching an estimated 51,276 unique PSVs throughout the country. Those numbers include stickers distributed since May 2015 at DLA branches, NTSA centers, as well as in Bus Parks across the country by *gui2de* enumerators during the latest round of compliance checks.

The NTSA facilitates distribution of stickers at its 17 inspection centers across the country, and has also engaged in promotion of *Zusha!*, through billboards, radio ads, and television commercials. The existing partnership between the NTSA and *Zusha!* is currently being strengthened and institutionalized through a Memorandum of Understanding (MOU). In addition, NTSA leadership is considering an additional proposal from the research team to more closely integrate *Zusha!* into the NTSA’s standard operations by incorporating sticker distribution and data collection into the Authority’s new digital platform for the annual inspection process. DLA also facilitates distribution at its 17 branches across the country, and issues stickers to third-party agents and drivers who come in to purchase insurance for their PSVs, which typically occurs monthly. In addition, DLA administers a weekly lottery to incentivize agents, drivers, and owners to comply with the intervention and keep the *Zusha!* stickers inside their vehicles.

This report will present in detail the key activities of the scale-up, including:

- (1) **Timeline**
- (2) **Sticker** design
- (3) **Distribution** of stickers, including lottery incentives
- (4) **Monitoring** of compliance with sticker placement and retention
- (5) **Data collection** on accidents
- (6) **Analysis** of newly acquired claims data and long-term trends

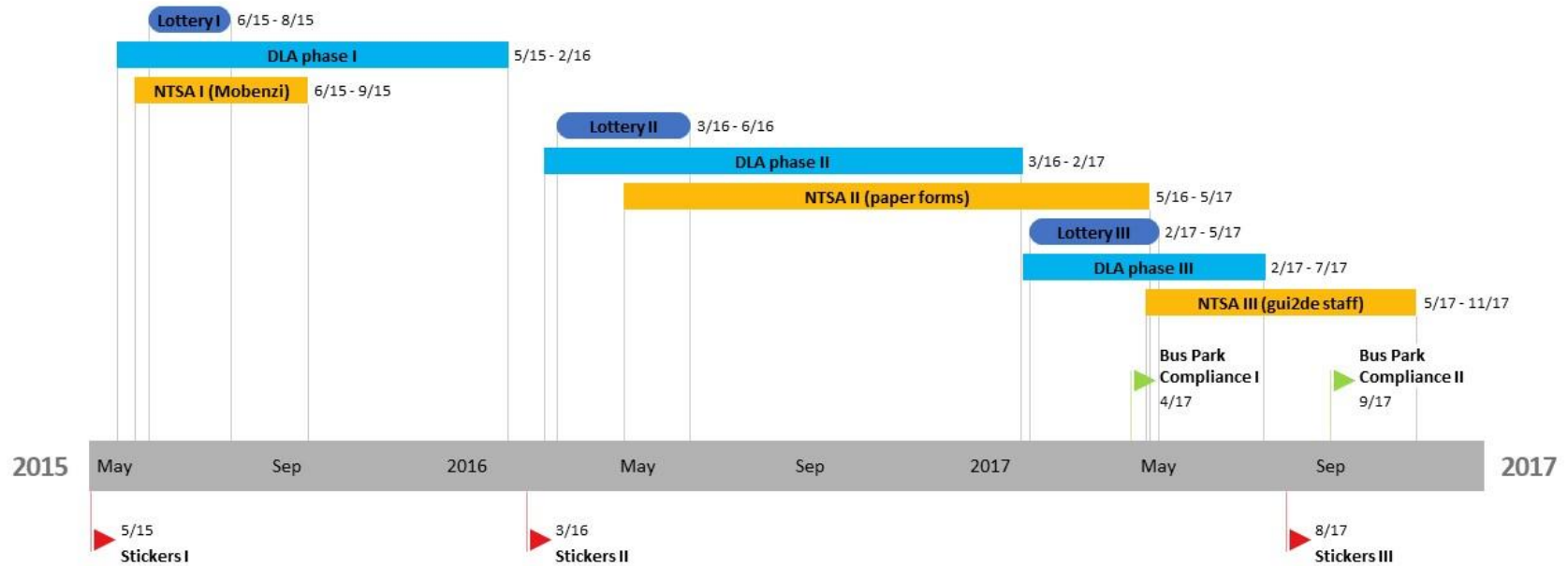
Although *Zusha!* in Kenya is no longer being implemented as an RCT, due to logistical irregularities, a significant number of vehicles insured by DLA during the distribution period did not receive stickers, thereby providing a quasi-experimental comparison group against which to estimate the impact of the intervention.

The figure below summarizes the timeline of the main activities of the *Zusha!* scale-up.

Figure 1.0: *Zusha!* scale-up timeline



Sticker Distribution and Compliance Monitoring Timeline



II. STICKER DESIGN

Stickers in Kenya include messages in both English and Swahili. In each phase, two unique sets of eight stickers are produced. Matatus are issued with four stickers each (two in English and two in Swahili), and buses receive a set of eight (four in English and four in Swahili).

Stickers are packaged and delivered in envelopes that include placement instructions and, for those distributed at DLA branches, information about the lottery promotion. (Only vehicles that receive their stickers through DLA, or are insured by DLA at the time of lottery drawing, are eligible for the lottery financed by the insurer.)

The sticker designs were informed by the results of the second RCT, in which alternative messaging strategies were compared. One outcome of that research was that it was important that the stickers promote coordinated group action. The tag line “Pamoja tuokoe maisha” (Together we can save lives) was thus incorporated in all sticker designs.

In addition, positive and negative images were both effective, but it was important to have *some* image. Thus, a mix of images demonstrating what passengers could do (i.e., speaking up), and what the consequences of not doing so might be (i.e., injury and death), was created. Some of the stickers deployed as part of the scale up are shown in Figures 1.1 and 1.2.

The envelopes used at the NTSA and at DLA offices are depicted in Figures 1.3 and 1.4, respectively.

Figure 1.1: Sample of Phase II stickers



Figure 1.2: Sample of Phase III stickers



Figure 1.3: NTSA sticker envelopes



Figure 1.4: Directline sticker envelopes



9000 pc



III. DISTRIBUTION

Distribution of *Zusha!* stickers in Kenya occurs through both the NTSA and DLA, each of which has 17 distribution sites. *Zusha!* employees work alongside NTSA staff at each of the Authority's inspection centers across the country, issuing stickers to PSVs as they come through for their annual inspection. DLA staff distribute stickers to agents who purchase insurance coverage on behalf of vehicle owners at the company's branches across the country. Recently, *Zusha!* staff also distributed stickers directly in PSV parks across the country during a round of compliance checks.

An important trade-off exists between these distribution strategies: at the NTSA, *Zusha!* staff insert stickers directly, but vehicles pass through at most once per year; when issued through DLA offices on the other hand, stickers travel a longer route (possibly from the agent to the SACCO or owner, from the owner to the driver, and then on to the conductor, before being inserted), but because most vehicles purchase insurance on a monthly basis, there is potentially a higher chance of any given vehicle being exposed to the intervention.

Distribution of stickers during the scale-up were planned in "Phases." Initially, a Phase was envisioned as a six-month period during which the current sticker designs would be distributed. At Directline, the designation of a Phase meant that a vehicle would only be issued one set of stickers during that period, regardless of how many times it purchased insurance. At the end of the Phase, new stickers would be designed, and the system would be reset so that all vehicles were again eligible to receive an updated set. The Phase length was intended to correspond to the expected lifecycle of a sticker inside the vehicle, and served to allow for periodic design refreshes to ensure the stickers continued to engage passengers' attention. However, due to logistical challenges, particularly with the lottery and DLA's systems, the Phases were not exactly six months and did not perfectly align with the lottery period, and there are often gaps in DLA's distribution both during and between Phases (described in detail later in the report). The sticker distribution at NTSA centers, on the other hand, is independent from DLA's system. Because vehicles which receive stickers from the NTSA are not eligible for the lottery run by Directline (unless they are insured by DLA at the time of the draw), stickers are distributed continuously at the inspection centers throughout the Phases.

- **Phase I:** May 21, 2015 – February 17, 2016
- **Phase II:** March 15, 2016 – February 11, 2016
- **Phase III:** February 13, 2016 – August 1, 2017 (data shared with the *Zusha!* team through July 19, 2017)

Throughout the three Phases and through all sticker distribution channels, since May 2015, approximately 104,730 full sets of stickers have been issued as part of the scale-up, reaching an estimated 51,276 unique PSVs throughout the country. The timeline of distribution is graphed in the figures below.

Figure 1.5: Total sticker distribution since May 2015

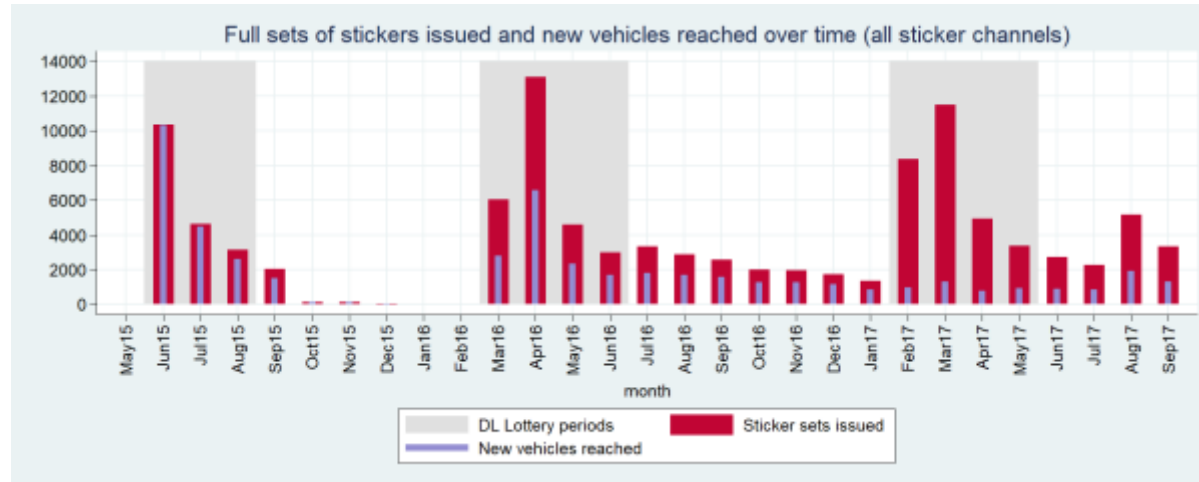
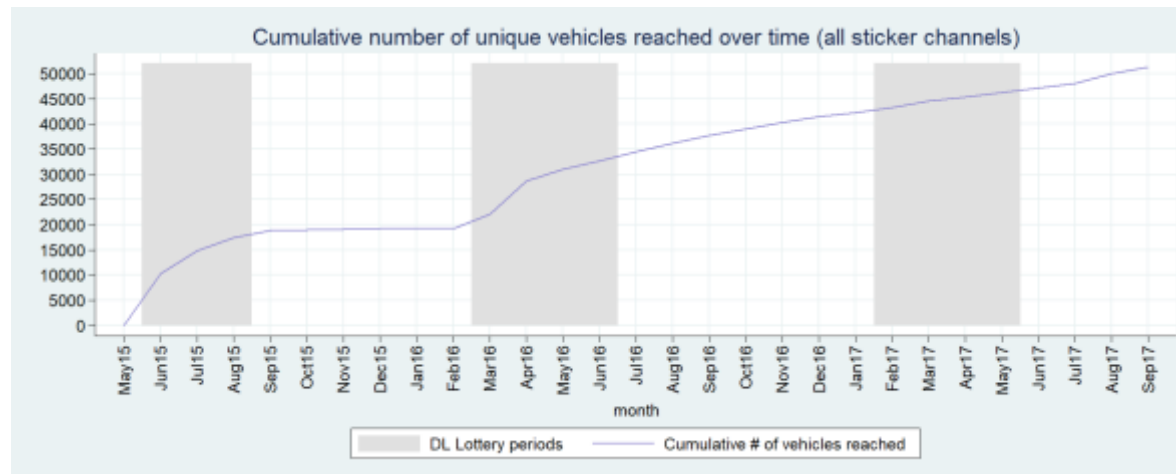


Figure 1.6: Cumulative number of unique vehicles reached since May 2015



DIRECTLINE

Insurance is usually purchased from DLA by a third-party agent on behalf of the owner of the vehicle on a monthly basis (though occasionally the owner or driver purchases the policy directly). When the agent purchases coverage, the vehicle's registration plate is entered into Directline's database, and an adhesive medallion that indicates the vehicle's coverage is generated and printed. During the second RCT trial, the research team worked with DLA's IT staff to create a software application that prompts the DLA Front Desk Officers to issue an envelope of stickers to each vehicle for which the agent is purchasing insurance, and scan a barcode printed on the outside of the envelope, thereby linking a set of stickers to a vehicle by registration plate number.

Stickers have been issued in three Phases over the two years of the scale-up, typically on a 6-9 month basis. The IT system, which is centrally controlled at the company's headquarters in Nairobi, is designed to allow a vehicle to receive only one set of stickers from DLA per Phase, regardless of how many times insurance coverage is purchased during the period. At the beginning of each subsequent Phase, the system is reset, and the vehicle is again eligible to receive a new set of stickers. In steady state, the research team hopes to conduct a new Phase every six months, with a continuously operating lottery.

To operate a lottery, a license from Kenya's Betting Control and Licensing Board (BCLB) is required. The first two licenses obtained by the project were valid for 10 weeks; new regulations allow for a 12-week promotional period. Various financial and administrative obligations are incurred during this process, including the payment of a fee, securing a bank guarantee, and completion of paperwork. At the end of the 12-week period, proof that prizes have been paid must be submitted to the Board before another license can be sought.

BCLB regulations theoretically prevent Directline from issuing stickers outside of the lottery period; however, the available data suggest that a very small number of stickers were issued outside of the authorized dates, as shown in the graph below (Figure 1.8). This could have occurred because, despite the centralized control of the IT system prompting sales agents to issue stickers, branches have the ability to manually over-ride these central directives, and could have done so due to a communication breakdown between HQ and the individual branches. (For example, anecdotal feedback suggests that many branch managers find the lottery to be a useful marketing tool, and so may have wanted to continue the promotion despite instructions from HQ.)

In any case, all sticker issues, regardless of whether they occur within an official lottery period, are captured by the barcode system, and are included in the dataset. The research team is currently working with DLA to better understand the reasons for and minimize these occurrences.

The *Zusha!* team periodically trains all Directline Front Office staff, and has also provided a detailed reference manual and is in constant communication (through calls, emails, and social media platforms such as WhatsApp and Facebook) in order to manage sticker inventory at the branches and to assist the DLA staff with any questions.

Directline regularly provides the research team with data on sticker distribution exported from their IT system, including the vehicle's registration plate, date of sticker issue, and barcode of the sticker envelope issued to each vehicle. A sample of the output can be seen below.

Figure 1.7: Example of sticker issue dataset export from DLA

| stickerid | s_code | S_harsh | G_ID | reg_marks | i_date | cp_name | certno |
|-----------|--------|---------|------|-----------|-----------------|----------------------------|--------|
| 124402 | M29402 | M29402 | 2 | KAN 137F | 7/19/2017 13:55 | Certificate Printer7 (MSA) | NULL |
| 117341 | M22341 | M22341 | 2 | KAV 472U | 7/19/2017 13:06 | Certificate Printer7 (MSA) | NULL |
| 116982 | M21982 | M21982 | 2 | KAU 892P | 7/19/2017 13:05 | Certificate Printer7 (MSA) | NULL |

stickerid = code for the sticker set
 s_code = barcode from the envelope
 S_harsh = barcode from the envelope
 G_ID = code that identifies the type of sticker sets: 2 is for matatus, 1 is for bus
 reg_marks = registration plate of the vehicle
 i_date = date of issue
 cp_name = name of the printer at which the transaction was
 certno = insurance medallion number

The current database includes records of sticker issues occurring between May 2015 and July 2017. As of 1 August 2017, Directline has stopped distributing stickers, as they finalize the returns for the most recent lottery license and file an application for a new one with the BCLB. The next lottery phase is expected to begin in November 2017.

Since May 2015, Directline has issued 70,936 sets of stickers to 37,405 unique vehicles.

Figure 1.8: Number of sticker sets issued and vehicles reached each month by DLA

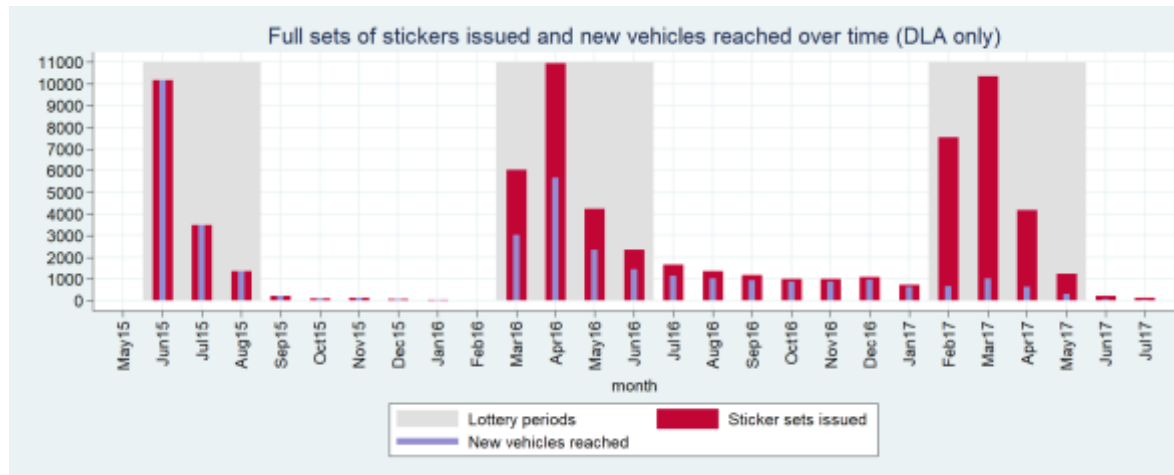
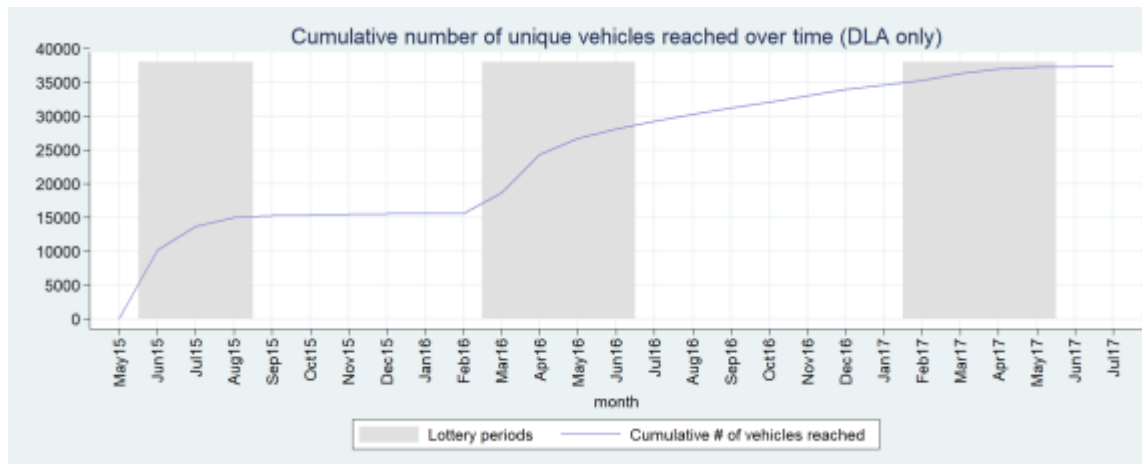


Figure 1.9: Cumulative number of new vehicles reached each month by Directline



NATIONAL TRANSPORT SAFETY AUTHORITY (NTSA)

Stickers have been issued at each of the NTSA's 17 regional inspection centers since the start of the scale up in May 2015. However, the protocol for distributing stickers and collecting data on vehicles has changed and improved over time.

Between June and September 2015, NTSA staff were trained by the *Zusha!* team to issue stickers to vehicles coming through the center for their annual inspection, and collect data on Mobenzi, an early generation mobile phone survey application. Approximately 5,900 unique vehicles were reached through this strategy, 1,200 of which already had a full set of stickers (received from Directline). Because a robust partnership with NTSA had not yet been established and workflows were still being piloted, NTSA staff from just seven centers were issuing stickers and collecting data during this period.

Between May 2016 and May 2017, NTSA staff from each of the 17 centers were authorized to work with *Zusha!* to issue stickers and collect data. However, neither the project nor the Authority had funding at the time to equip these staff members with mobile phones or tablets, so paper forms were used. An example of a completed form can be seen below in Figure 2.0.

Figure 2.0: Example of a *Zusha!* paper form completed by NTSA inspection center staff

| ZUSHA DATA COLLECTION FORM FOR ALL PUBLIC SERVICE VEHICLES | | | | | | | | | | | | |
|--|---------------|-----------------------------|--|------------------|---------------------|---|---|---------------------------------|--|---|------------------------------------|---------------------------------|
| No. | Date of Issue | Vehicle Registration Number | Vehicle Route/Town Service TS or Long distance LD) | Sitting Capacity | Name of SACCO | Which insurance company covers the PSV? | Does the PSV already have Zusha stickers? | How many stickers does it have? | Are the stickers placed the correct way? | Have you issued the PSV zusha stickers? | How many stickers have you issued? | Please enter the barcode number |
| 1 | 3/7/16 | KAB71621 | LD | 51 | Eastern line | INVECO | NO | 0 | NA | YES | 8 | NM1784 |
| 2 | 1/7/16 | KCH623L | LD | 14 | Western Shuttle | INVECO | NO | N/A | N/A | YES | 4 | NM35 |
| 3 | 1/7/16 | KCH688M | LD | 14 | " | " | " | " | " | " | 4 | NM509 |
| 4 | 1/7/16 | KAB6880 | LD | 14 | Western Shuttle | " | " | " | " | " | 4 | NM687 |
| 5 | 4/7/16 | KB7445F | LD | 11 | Kabral line | " | NO | N/A | N/A | YES | 4 | NM711 |
| 6 | 4/7/16 | KAX379M | LD | 14 | Muriba Shuttle | INVECO | NO | N/A | N/A | YES | 4 | NM942 |
| 7 | 5/7/16 | KB541Y | LD | 7 | Muriba Shuttle | INVECO | NO | N/A | N/A | YES | 4 | NM175 |
| 8 | 5/7/16 | KBZ123Y | LD | 11 | Western Shuttle | INVECO | NO | N/A | N/A | YES | 4 | NM733 |
| 9 | 5/7/16 | KCH986L | LD | 11 | Kabral line | INVECO | NO | N/A | N/A | YES | 4 | NM686 |
| 10 | 5/7/16 | KBF442G | LD | 14 | Western Shuttle | INVECO | NO | N/A | N/A | YES | 4 | NM730 |
| 11 | 5/7/16 | KAT389S | LD | 14 | Kabral line | INVECO | NO | N/A | N/A | YES | 4 | NM142 |
| 12 | 5/7/16 | KAW083R | LD | 14 | Western Shuttle | INVECO | NO | N/A | N/A | YES | 4 | NM141 |
| 13 | 6/7/16 | KAX085F | LD | 16 | Western Shuttle | INVECO | NO | N/A | N/A | YES | 4 | NM494 |
| 14 | 6/7/16 | KCH661L | LD | 14 | Kabral line Shuttle | INVECO | NO | N/A | N/A | YES | 4 | NM577 |
| 15 | 6/7/16 | KCD402P | LD | 14 | Kabral line Shuttle | INVECO | NO | N/A | N/A | " | 4 | NM480 |

Every month, each branch sent its collection of paper forms to NTSA's central Headquarters in Nairobi to be digitized by the IT staff. Both original and transcribed records were eventually shared with the *Zusha!* team, though there was often a significant delay and the records are still incomplete across all centers. Although the data is still being compiled, cleaned, and analyzed, approximately 15,000 unique vehicles were surveyed and received stickers over the 12-month period through this workflow.

Requiring NTSA staff to fill out an additional paper form that recorded much of the same information they were required to also collect on the Motor Vehicle Inspection (MVI) form during the actual inspection was a burdensome and inefficient process, and resulted in incomplete and unreliable data collection. This was confirmed by comparing the information collected on the *Zusha!* forms with the MVI forms, which showed that many more vehicles came through for inspection than were recorded on *Zusha!* forms. One reason for this was that NTSA staff often did not fill out the form for vehicles that arrived at the center with a full set of stickers, thus providing an incomplete picture of monitoring and compliance.

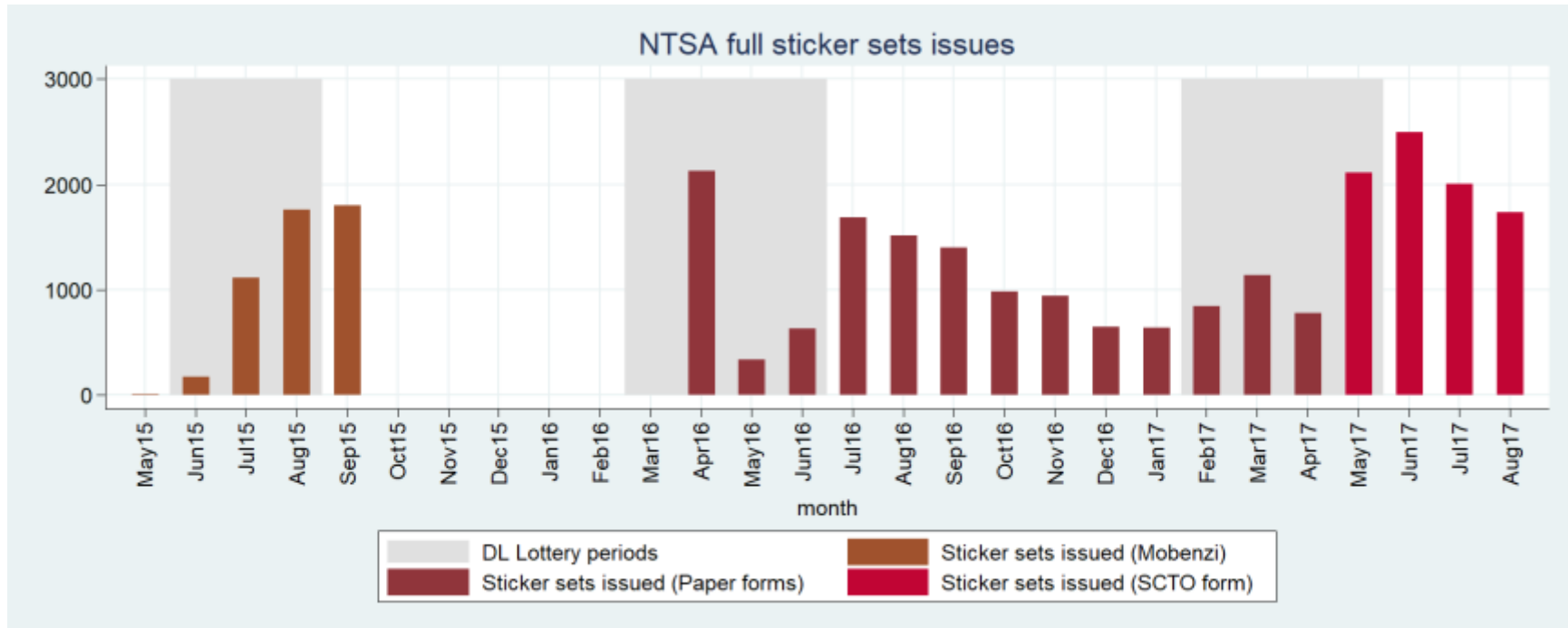
In addition, it was discovered that NTSA staff often simply handed the drivers an envelope of stickers, as opposed to directly placing them inside the vehicle, thereby increasing the likelihood that the vehicle was not properly exposed to the intervention.

After extensive discussions with NTSA leadership about how to improve this system and ensure the collection of accurate and comprehensive data and reliable distribution of stickers, in May of 2017 the Authority agreed to allow *Zusha!* to place its own staff members at each center to collect data on vehicles coming through for inspection, and directly issue stickers to vehicles. These enumerators are equipped with tablets, on which they fill out a SurveyCTO form. They typically survey the vehicles as they first arrive at the center and queue at the weigh bridge to wait for inspection. The survey collects the following information:

- Location of survey (NTSA center)
- Registration plate number
- Type of vehicle
- Date of previous NTSA inspection
- Person being surveyed (driver, owner, or broker)
- Seating capacity
- SACCO membership
- Number of routes, and details of main and secondary routes (departure and destination park locations and stages)
- Company currently insuring the PSV
- Town in which most recent insurance was purchased
- Channel through which most recent insurance was purchased (driver, owner, agent, SACCO, other)
- If the vehicle has ever received *Zusha!* stickers
 - If yes, where and when
- If the driver has an envelope of stickers that are not placed inside the vehicle
- If the vehicle was cleaned prior to inspection
- How many stickers were inside the vehicle when it arrived for inspection, and their condition and placement
- How many stickers the enumerator issued the vehicle
- Pictures of the stickers that were placed inside the vehicle

Since May 2017, 10,475 vehicles have been reached by *Zusha!* enumerators at NTSA inspection centers. About 9,800 of these vehicles were issued stickers, of which 8,400 received a full set. This process of distribution and data collection is much more reliable than previous strategies, and allows for significantly more oversight by the research team. Across all phases of distribution at the NTSA since May 2015, an estimated 24,000 unique vehicles have been issued full sets of stickers, and approximately 2,300 have been issued partial refreshes or replacements.

Figure 2.1: Number of sticker issues at NTSA across all Phases



*These numbers are preliminary as some of this data is still being received and cleaned. The graph does not include sticker refreshes (vehicles that already had stickers and were issued a partial set).

DATA QUALITY

Having *Zusha!*-dedicated staff has provided the research team with much greater control over the data collection process at the NTSA inspection centers. Collecting the data in SurveyCTO also allows for extensive ex-ante, live, and ex-post data quality checks to be employed.

Ex-ante checks: embedded survey constraints

Surveys were coded to minimize human error and missing values.

- Constrained answer fields
 - Registration plate has to follow a defined regular expression pattern, and is entered twice
 - Seating capacity has to be consistent with vehicle type
 - Many variables are chosen from pre-registered lists: center, region and district for routes, insurance company, for the main ones
 - Barcodes from envelopes are directly scanned from the tablet
- Inconsistencies checks
 - The number of stickers issued must equal the number of missing/damaged stickers (if not, enumerators must provide an explanation)
 - The number of sticker issued must be larger than the number of envelopes used (barcodes scanned), and smaller than eight
- Duplicates check
 - When a registration plate is entered, the number is checked against the database of enrolled vehicles. If the vehicle has already been surveyed, the enumerator can explain why the vehicle is returning to the NTSA, and proceed to a quick sticker inspection without administering the entire survey again

Live monitoring: high frequency checks

Survey entries were monitored daily and included systematic checks of:

- Enumerators metrics: daily submissions, survey duration, summary stats on key variables
- Survey metrics: duplicates, discrepancies in # of stickers issued vs recommended, unexpected # of stickers, errors in scanned barcode, barcodes scanned more often than expected, enumerators checking in wrong centers, overall missing values

Ex-post checks: picture backchecks

- Enumerators were prompted to take a picture of the stickers after placing them inside the vehicle. Those pictures were checked daily to verify the correct placement of stickers, and that each vehicle was left with a full set; any errors were discussed with enumerators.
- Below are the results of the picture checks conducted for the NTSA surveys submitted by the *Zusha!* team. Pictures were taken after the enumerators refreshed a vehicle's stickers, not of the original stickers (if any) that were inside the vehicle when it arrived at the center. Therefore, the pictures should have revealed a full set of four stickers for a matatu and eight stickers for a bus.

Results of the NTSA Survey Data Quality Checks (Pictures)

| Week of audit | Survey dates | # Surveys audited | Type of Errors (error in sticker placement) | | Sticker placement error rate | Type of Errors (error in audit process) | | | Audit process error rate | Total error rate |
|---------------|-------------------|-------------------|---|-----------------------------|------------------------------|---|------------------|---------------|--------------------------|------------------|
| | | | Incorrect # of stickers pictured | Incorrectly placed stickers | | Unusable image | Incomplete image | Auditor error | | |
| 1 | July 24 - July 28 | 140 | 8 | 6 | 10% | 8 | 3 | 4 | 10% | 20% |
| 2 | July 26 -Aug 3 | 347 | 9 | 1 | 3% | 8 | 148 | -- | 45% | 48% |
| 3** | Aug 4 - Aug 17 | 47 | -- | -- | 0% | 1 | 12 | 2 | 32% | 32% |
| 4 | Aug 18 - Aug 24 | 52 | -- | -- | 0% | 1 | -- | -- | 2% | 2% |
| 5 | Aug 25 - Aug 31 | 60 | 1 | -- | 2% | -- | -- | -- | 0% | 2% |
| 6 | Sept 1 - Sept 7 | 60 | -- | -- | 0% | -- | -- | -- | 0% | 0% |
| 7 | Sept 8 - Sept 14 | 69 | 2 | -- | 3% | -- | -- | -- | 3% | 3% |

Incorrect # of stickers pictures: when the enumerator failed to capture all the stickers in the vehicle in the photo

Incorrectly placed stickers: when the enumerator placed stickers on the windows and not the frame above

Unusable images: when images were either not well angled, too dark, or too blurry to audit

Incomplete image: when the enumerator cut off the sticker in the image so that it was not possible to tell if the complete sticker (logo, messaging, and image) was present in the vehicle

Auditor error: when the auditor erroneously marked the survey as having an error. This usually occurred when the auditor did not see a sticker in the image or did not see fabric on the ceiling of the vehicle and thought stickers on the windows were incorrectly placed. These mistakes were caught through review by the research team.

**All NTSA enumerators were re-trained by *Zusha!* staff in the third week. Most of the errors resulted from enumerators misunderstanding the purpose of the images and failing to take properly framed pictures. The error rate significantly decreased after this re-training.

Ex-post checks: audio backchecks

- SurveyCTO was programmed to take an audio recording of each survey module following consent. Enumerators were made aware of the recording during training to deter cheating. This has proven to be a useful enforcement mechanism, and has provided corroborating evidence that has been used to fire several enumerators who were repeatedly non-compliant with the measurement protocols.
- The audio recordings of a random 10% selection of surveys were analyzed to further verify that the interaction between the enumerator and the driver was legitimate, and the survey was administered completely and accurately. Although it was discovered that there are valid circumstances in which the enumerator does not need to administer the survey live in order to collect the data¹, a review of the recordings allowed the research team to confirm certain data points within the survey, such as name of SACCO, etc.
- On an on-going basis, a random 10% sample of surveys is selected for identified data points to be backchecked using the audio recording. Audio recordings are taken of all surveys, however, so recordings can be used on a case-by-case basis to corroborate evidence of misconduct by enumerators.

¹ For example, some brokers bring multiple vehicles to the center for inspection, and provide the details of each vehicle to the enumerator all at once rather than through separately administered surveys. The enumerator then enters the information into unique forms for submission.

Ex-post checks: Motor Vehicle Inspection form validation

- The MVI forms that the NTSA Investigators use to record information on each vehicle that comes through the inspection center every day are typically shared with the *Zusha!* team monthly (although delays and incomplete transcriptions are common). Once the team receives complete records, a comparison will be conducted of the vehicle information from the MVI forms with the *Zusha!* surveys submitted by project staff. This will allow for validation of several variables for each vehicle, including:
 - Registration plate number
 - Insurance provider
 - Seating capacity

NTSA DISTRIBUTION SUMMARY

Before placing stickers in vehicles, enumerators conduct a brief survey which includes a sticker check. This allows a continuous monitoring of compliance for vehicles coming for inspection. The observed compliance rates are listed below; because there was no significant different between rates for matatus and buses, the numbers below combine the two vehicle types.

| NTSA Distribution Survey | | |
|---------------------------------------|--------|--------|
| May – September 2017 | | |
| # total vehicles surveyed (consented) | 10,533 | |
| matatus | 8,712 | 83% |
| buses | 1,821 | 17% |
| <i>all vehicles</i> | | |
| vehicles with at least one sticker | 3,142 | 29.84% |
| vehicles with all stickers | 1,280 | 12.15% |
| vehicles with all but one stickers | 516 | 4.90% |

In September of 2017, it was discovered that many vehicles are extensively cleaned prior to inspection, including fresh paint applied to the exterior and interior of the vehicle. As part of this process, *Zusha!* stickers were often removed, which may have deflated the number of vehicles recorded by enumerators as having stickers upon arrival at the center. On 18 September 2017, a question was added to the survey to try and measure how frequently this was occurring. After three days, 260 vehicles were surveyed with this question. The results are summarized below.

| NTSA Distribution Survey – Sticker Removal | | |
|---|-----|--------|
| 18 September – 20 September 2017 | | |
| # vehicles surveyed | 260 | |
| Was the vehicle cleaned? | | |
| NO | 155 | 59.62% |
| YES | 97 | 37.31% |
| DON'T KNOW | 8 | 3.08% |
| IF YES: Were <i>Zusha!</i> stickers removed prior to cleaning? | | |
| NO | 38 | 39.18% |
| YES | 53 | 54.64% |
| DON'T KNOW | 6 | 6.19% |

These numbers suggest that the removal of *Zusha!* stickers prior to inspection is not an uncommon occurrence, and is likely resulting in lower saturation and compliance rates being observed.

Zusha! stickers may be taken out as part of the cleaning process, or because drivers mistakenly believe they will not pass inspection if they have them inside their vehicles. Previous Kenyan laws have attempted to outlaw extensive interior and exterior decorating of PSVs, and although the NTSA has publicly endorsed the *Zusha!* campaign and approves the placement of stickers inside vehicles, it is possible some drivers remove them prior to inspection to avoid falsely anticipated fines or failure.

IV. COMPLIANCE

LOTTERY

In addition to distributing stickers, Directline also runs and funds the weekly lottery, which serves to incentivize agents to deliver the stickers to the drivers, and the drivers to place the vehicles inside their vehicles and keep them in. Each week, eight registration plate numbers are randomly drawn from the pool of vehicles currently insured by Directline. The eligible vehicles are contacted and told of their opportunity to win the lottery, and an inspection is arranged. If the vehicle has the correct number of stickers, they are declared a winner by DLA's inspection agents, and a monetary prize is sent to each of the owner, driver, and insurance agent. The prize is KES 5,000 each, the equivalent of approximately \$50 USD.

Three lottery licenses have been obtained since the start of the scale up in May 2015. Due to new BCLB regulations, the first two licenses authorized 10 weeks of draws, and the most recent license authorized a 12-week period, with several additional weeks for inspections and redraws to be conducted. Redraws are allowed to replace vehicles that could not be found or were uncooperative.

- **Promotion I:** 6 June 2015 – 7 August 2015
- **Promotion II:** 24 March 2016 – 24 June 2016
- **Promotion III:** 17 February 2017 – 19 May 2017

PROCESS

- From the database of all PSVs currently insured by Directline, eight vehicles are randomly drawn each week. The lottery draw is conducted every Friday; a staff member from Directline, the BCLB, and the *Zusha!* team are all present at the draw. The selection algorithm ensures at least one vehicle from each of the 17 active Directline branches is selected before additional vehicles are drawn.
- A sign-off sheet is then prepared for all the parties present to sign to confirm the selected vehicles. The Directline team records the vehicles in a spreadsheet that includes the phone number of the agent or owner of the vehicle, the branch of insurance issue, the registration plate number, and the insurance policy number. This information is sent to the Directline Investigations Manager. An example of the draw sign-off sheet can be seen below.

Figure 2.2: Sample lottery draw verification sheet

DIRECTLINE ASSURANCE **DDD** **guide** **ZISHA**

Randomization sign off sheet **KBU 803R**

On this day 03/03/2017 8 PSVs have randomly been selected by Directline Assurance for the Zusha! Road safety campaign promotion.

| Branch Name | Number of PSVs at the time of randomization | Number plate of PSV randomized |
|-------------|---|--------------------------------|
| 1. KISUMU | 1. 273 | 1. KCU 052W |
| 2. MOMBASA | 2. 521 | 2. KAU 803R ✓ |
| 3. NAIROBI | 3. 4280 | 3. KBU 803R |
| 4. NAKURU | 4. 906 | 4. KBX 224N |
| 5. THIKA | 5. 800 | 5. KBL 433N |
| 6. NAIROBI | 6. 4280 | 6. KBF 870A |
| 7. NAIROBI | 7. 4280 | 7. KAS 515C |
| 8. NAIROBI | 8. 4281 | 8. KAL 0434 |

M10336 *[Signature]*

The draw was conducted at Directline Assurance offices located at Hazina Towers, 5th Flr, Monrovia Street.

The random selection was conducted under the presence of an agent from Betting Control and Licensing Board name listed below.

Directline Assurance and BCLB will conduct an inspection in all the selected matatus to confirm the ones who will be awarded as winners. The inspections will be conducted within the next week after this random selection.

A PSV that is found to have retained all four (4) or eight (8) unique stickers that were assigned to it in place, as stipulated in terms and conditions, will be deemed a winning vehicle.

Conducted by Frederick Olayo
 Position Directline Underwriting
 Signature [Signature]
 Phone number 0711030151
0722242401
03/03/2017

Witnessed By Edwin W. W. Hart
 Position Zusha! Program Director
 Signature [Signature]
 Phone number 0702999070

BCLB [Signature]
 2nd Witness By [Signature]
 Position Licensing Inspector
 Signature [Signature]
 Phone number 0722369763

- The Investigations Manager assigns the selected vehicles to his team of Investigators based on the branch where the policy was issued. The Investigators call the driver, explain the details of the promotion, and arrange for a time to inspect the vehicle.
- The Investigator meets the driver with the vehicle and completes the “Investigation/Verification Form.” Investigators check that all the stickers are in place (four stickers for a matatu and eight for a bus). The Investigator takes pictures to confirm the correct placement of the stickers in the vehicle. These images are shared with the Investigations Manager, and are subsequently provided to the Zusha! team. Example of the inspection paperwork are below.

Figure 2.3: Sample lottery verification form

Draw held on: 03/03/2017

DIRECTLINE **ZUSA**

Verification Form

This form should be filled appropriately as it determines whether a vehicle is a winner or not.

Vehicle Details:

1. What is the policy number of the vehicle? 03123957
2. What is the registration of the vehicle being inspected? KBU 803R
3. What route does the vehicle operate from? NASROA EMALI
4. What is the name of the Sacco? NAE WAKWA SACCO
5. Is this a bus or a matatu (Please note that a matatu is a vehicle that has 14 passengers and below while a bus is one that has 13 passengers and above)? Please tick appropriately.
 Bus Matatu Number of seats 14

Details of the owner, driver, and agent:
 Please indicate the names and phone numbers:

1. Owner: ALICE MBOTELA - 0721224072
2. Driver at the time of inspection: DAVID N. NUNYA - 0721793177
3. Agent: TITUS MUSHOMA - 0720715998

Inspection
 Conditions for winning: If a vehicle has all the stickers issued, and they are placed correctly then it is a winner. If the vehicle does not have all the stickers and/or they are not placed correctly then it is not a winner.

1. Does the vehicle have all the stickers issued? (Buses with more than 14 passengers should have 8 stickers and Matatus with 14 passengers should have 6 stickers) Yes or No: YES
2. Have the stickers been placed correctly? Yes or No: YES
3. Based on the conditions for winning, is this vehicle a winner? Yes or No: YES

I, as the OWNER / AGENT / DRIVER (circle one), agree that the vehicle DID / DID NOT (circle one) meet the conditions for winning. Moreover, in the case of a winning vehicle, I agree that Directline will not be held liable if upon issuing the prize winning the recipient name does not match the number which is listed below.

Signature: [Signature] Date: 22-3-17 Name: ALICE MBOTELA

For winning Vehicles, indicate how you would like to receive your prize. Please ensure that the number you provide is registered under your name.

| | Phone number | Mode of payment |
|--------|-----------------------------------|-----------------|
| Owner | <u>ALICE MBOTELA 0721 224072</u> | <u>M-PESA</u> |
| Driver | <u>DAVID N. NUNYA 0721 793177</u> | <u>M-PESA</u> |
| Agent | <u>TITUS MUSHOMA 0720 715998</u> | <u>M-PESA</u> |

Each individual is required to attach a photocopy of their ID or PIN, the driver should also attach a copy of their driving license and the owner should also attach a copy of their log book or sales agreement.

Investigators name: [Signature] Signature: [Signature]

Payment approval:

Approved by: [Signature] 29.03.17
 Position-Directline: [Signature]
 Signature: [Signature]

2nd Approval By: [Signature]
 Position-Directline: [Signature]
 Signature: [Signature] 31/03/17

Figure 2.4: Sample pictures submitted with the lottery Investigations Form



- The Investigator confirms that the information of the driver, owner, and agent is correct. If the vehicle passes inspection and is determined to be a winner, the Investigator attaches documentation from the PSV to the inspection form, including a photocopy of the driver’s National ID or PIN, a copy of his driver’s license, and a copy of the owner’s log book or sales agreement.
- The Investigations Manager collects the hard copies of the “Investigation Forms” from the Investigators that had been sent to verify winners in the field. These forms are given to the Underwriting Manager before the next draw is conducted. The Investigations Manager shares the updated list of inspected vehicles and whether or not they won with the *Zusha!* team. The “Investigation Form” identifies any reasons a vehicle might have failed the inspection, such as having an incomplete set of stickers.
- The confirmed and verified list is shared with the finance team at Directline. The finance officers verify the documents and approve the payments, which are issued via mobile money transfer. All winners should receive their payments within seven days from the time of passing inspection. For each winning vehicle, KES 5,000 is awarded to the owner of that matatu, the driver of that matatu, and the insurance agent (if any) who sold coverage to that vehicle.
- The Underwriting Manager collects the copies of “Investigation Forms” and the “Proof of Payment Mpesa Form” and files them in the binder organized by weekly payments. Copies of these are shared with the *Zusha!* team, who then file the returns to the BCLB at the conclusion of the lottery period. Once the BCLB reviews and approves the returns, the lottery period is officially closed out, and a new application for the next lottery permit can be submitted.

| Lottery Compliance Rates | | | | | |
|---|-------------------------------|---------------------------------|--------------------------------|---------------------------------|--------------|
| | 6 Jun – 7 Aug 2015 | 24 Mar – 24 Jun 2016 | Jul 2016 – Jan 2017 | 17 Feb – 19 May 2017 | Total |
| | Promotion I | Promotion II | | Promotion III | |
| # registration numbers drawn | 80 | 120 | - | 99 | 299 |
| # inspections completed | 69 | 102 | - | 92 | 263 |
| # of winning vehicles | 58 | 87 | - | 82 | 227 |
| # of non-winning vehicles (failed inspection) | 11 | 15 | - | 10 | 36 |
| # of non-winning vehicles (not inspected) | 11 | 18 | - | 7 | 37 |
| Compliance rate (among all eligible vehicles) | 73% | 73% | - | 83% | 76% |
| Compliance rate (among inspected vehicles) | 84% | 85% | - | 89% | 86% |

CHALLENGES AND PROTOCOL CHANGES

Administering the lottery is an extremely logistically complex task that requires the coordination of many different organizations and departments. At each stage of both the application and the investigations processes, there are often significant delays at Directline. These delays, such as vehicles not being inspected promptly and winners not receiving payment as scheduled, undermine the credibility of the lottery. There are also significant communication lags with Directline’s updates to the *Zusha!* team, which makes reliably monitoring the lottery and associated compliance difficult.

In addition to the delays with partners, the BCLB’s regulations make a continuous running of the lottery impossible. Each license now authorizes draws for a period of 12 weeks (the first two licenses were valid for 10 weeks). Final inspections and the filing of paperwork often takes

another 4-8 weeks, and must be completed before Directline can apply for a new license. Once the application is submitted, review and approval by the BCLB can take up to another four weeks. The disruptions in the administration of the lottery limit the number of vehicles that can be reached, which dilutes the effectiveness of the promotion as both a positive incentive and a consistent compliance monitoring mechanism. Furthermore, DLA is required by BCLB regulation to stop issuing stickers during periods outside of the lottery periods, which significantly limits distribution.

The *Zusha!* team is currently working closely with DLA leadership to identify bottlenecks and make adjustments to the workflow to increase efficiency. However, it is unlikely that any significant improvement can be achieved because of the many structural constraints. The research team is also evaluating the feasibility of broadening the scope of the lottery beyond Directline, and possibly having the NTSA administer the lottery, or doing so directly.

The following improvements in the lottery process are currently being pursued with Directline:

- **Capacity building:** in addition to periodically training Directline Investigators on the *Zusha!* workflow, the research team will also begin training Directline Regional Managers who oversee the 17 branches countrywide. Because of high turnover among DLA Investigators, the *Zusha!* team is not always aware that an Investigator who has been previously trained has left DLA. Training DLA Regional Managers (who assign the investigators to work) would ensure that DLA regional staff are capable of training any new DLA Investigator as well as mitigating any regional issues with the lottery inspection process.
- **Information sharing and access:** verifying winning vehicles is done by Directline Investigators. Independent verification processes between Directline's departments can create bottlenecks and delay vehicle inspections and/or prize payments. *Zusha!* has proposed that its enumerators track documentation between Directline Investigators and Regional Managers to minimize delays and lost paperwork.
- **Contacting vehicles for inspection:** a standardized script has been provided to DLA Investigators to use when contacting vehicles drawn in the lottery in order to minimize the likelihood that drivers know they will be inspected for *Zusha!* stickers and thereby have an opportunity to game the inspection.
- **Winner payments:** the BCLB has formally reiterated the requirement that Directline Investigators inspect vehicles within seven working days after being drawn. The verification and payment process should take no more than a total of 14 working days.

BUS AND MATATU PARK CHECKS

Unlike in Uganda and Tanzania, where *Zusha!* is being implemented as a tightly-controlled RCT and enumerators are employed to directly administer the intervention, the process of distributing stickers through Directline in Kenya requires many more steps and coordination among several individuals.

The lottery therefore functions as a positive incentive for the three key actors in the process: the agents who need to deliver the stickers from the DLA office to the driver; the owners who need to allow *Zusha!* stickers in their PSV fleets; and the drivers who must place the stickers in their vehicles and keep them in. However, the lottery only allows the research team to check a very small percentage of vehicles which received stickers. DLA also does not insure the entire population of PSVs in Kenya, and covers approximately 60% of the market share at any given time. Therefore, because the lottery does not include vehicles that did not receive their stickers through DLA or are not covered by DLA at the time they are inspected, the lottery compliance rates are not necessarily representative of the universe of PSVs reached through all distribution channels.

In addition, because stickers are not placed directly in vehicles by enumerators in Kenya, it is far more likely that results from lottery reflect a moderate level of gaming. Based on anecdotal evidence and investigations, it is believed some agents and/or drivers simply retain their envelopes of *Zusha!* stickers until they are called and informed they have been drawn and are eligible for the lottery, at which time they place the stickers in their vehicles prior to arriving for inspection.

These assumptions were corroborated by independent direct checks conducted in matatu and bus parks across the country by the research team, which revealed a lower compliance rate than indicated by the lottery.

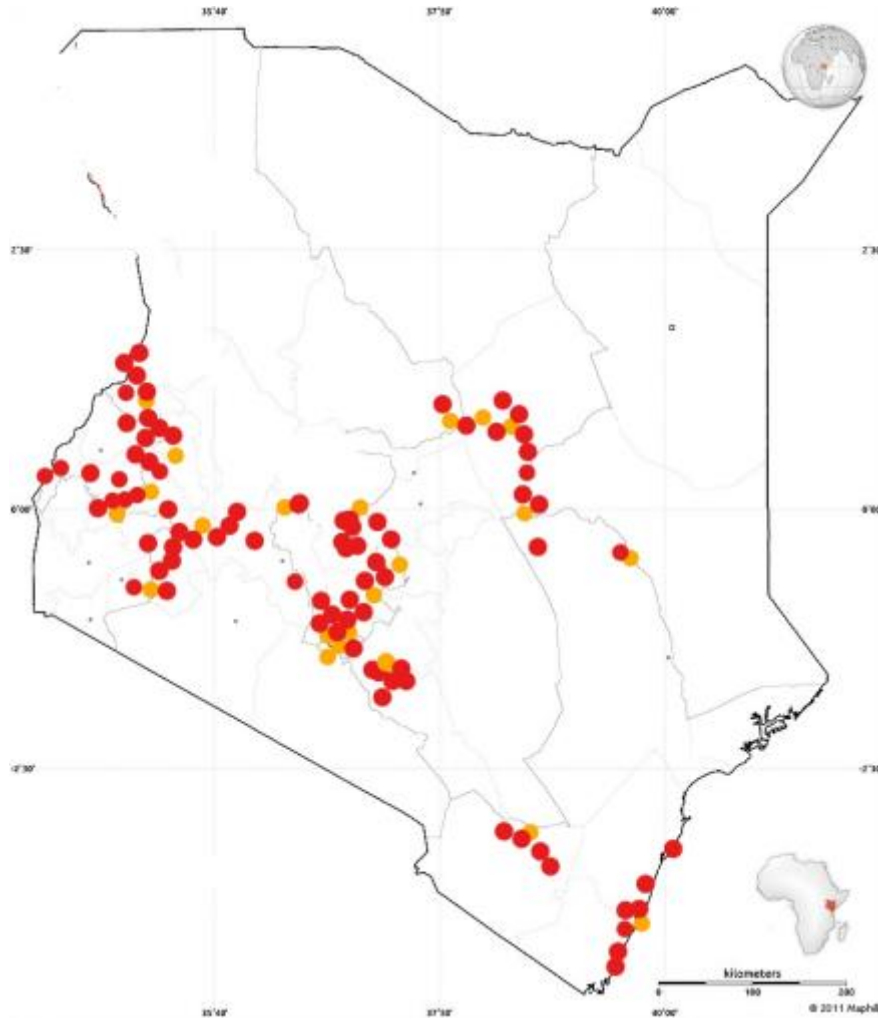
In order to get a more representative measure of compliance across the country among vehicles who received stickers at both DLA and NTSA, teams of 30 enumerators conducted two rounds of directly observed compliance checks in bus and taxi parks in over 90 towns across the country, ultimately surveying 20,770 unique vehicles.

During the second compliance check (Round II), stickers were also offered to all approached vehicles. Enumerators reached 11,600 vehicles, and directly placed stickers inside 9,507 unique vehicles during this round (approximately 5,600 received full sets, and 3,900 received replacements to complete an existing, partial set).

Destinations were chosen to collect a geographically representative sample and maximize the number of vehicles able to be reached over the time period. Enumerators started with the bigger, busier parks before moving to smaller ones.

A map of the towns in which compliance checks were conducted is below. Orange dots represent locations visited during both the first and second rounds of checks. Red dots indicate additional towns added during the second round.

Figure 2.5: Map of bus park compliance check town locations



- Round I: 25 March 2017 – 28 April 2017
 - 22 towns
 - 9,227 vehicles
- Round II: 31 July 2017 – 15 September 2017
 - 99 towns (Smaller towns were added to the original main parks visited during Round I in order to expand the representativeness of the sample.)
 - 11,600 vehicles
 - Many vehicles that run long-distance routes are only in taxi and bus parks in the early morning or late at night. In the second round of bus park compliance, survey times were expanded to include early morning data collection. Enumerators began at 6am.

The research team made a decision not to randomize the compliance checks, both for logistical reasons and because it would have required a comprehensive listing of all active PSVs in the country, which is not accessible. The current survey being administered through the NTSA (since May 2017) will be a source for a reliable sampling frame in the future, as all active PSVs are expected to travel through the centers over a 12-month period.

PROCESS

- Buses were inspected via a survey designed in SurveyCTO and administered on tablets
- Enumerators were trained in Nairobi for two days before being sent to their assigned location. Enumerators were instructed to survey all vehicles they found in the parks. They typically surveyed drivers at the stage while the bus or matatu waited to be filled with passengers.
- The survey was subject to consent of the driver. If the driver completed the survey, he was eligible to receive scratch card with KES 100 (about \$1 USD) in airtime, regardless of the vehicle's compliance status.
- Data was collected on the following variables:
 - Knowledge of and previous experiences with *Zusha!* (have/not received stickers, from where, when, how many times)
 - Insurance (company, last purchase -time, location, channel-)
 - Seating capacity
 - SACCO membership
 - Route information (for the primary route: type of route, start and end town)
 - Sticker inspection (number of stickers, damaged or misplaced stickers, and pictures of the inside of the vehicle)

Data Quality

As with the NTSA survey, the survey for the bus park compliance checks contained ex-ante, live, and ex-post quality checks.

Ex-ante checks: embedded survey constraints

Surveys were coded to minimize human error and missing values.

- Constrained answer fields
 - Registration plate had to follow a defined regular expression pattern, and was entered three times (twice at the beginning of the survey, once at the end)
 - Seating capacity had to be consistent with vehicle type
 - Many variables were chosen from pre-registered lists: bus park, region and district for routes, insurance company, for the main ones
- Inconsistencies checks
 - The number of stickers issued had to equal the number of missing/damaged stickers (if not, enumerators must provide an explanation)
- Duplicates check
 - When a registration plate was entered, the number was checked against the database of enrolled vehicles. If the vehicle had already been surveyed, the enumerator was prompted to move to a different vehicle.

Live monitoring: high frequency checks

Survey entries were monitored daily and included systematic checks of:

- Enumerators metrics (daily submissions, survey duration, means across key variables, rate of "I don't know"/missing answers), survey metrics (duplicates, geographical distribution), and potential discrepancies

- Survey metrics: duplicates, discrepancies in # of stickers issued vs recommended, unexpected # of stickers, errors in scanned barcode, barcodes scanned more often than expected, enumerators checking in wrong centers, overall missing values

Live monitoring: picture checks

- Enumerators took pictures of the inside of buses to validate the number of stickers inside the vehicle (or lack thereof). For the second bus park survey, a random 10% sample was backchecked daily to confirm accuracy of the numbers entered in the survey. (Results of this audit can be seen below.)

Ex-post checks: audio backchecks

- A random 10% of the surveys were recorded. As with the current pilot of analyzing audio recordings for the NTSA surveys, these recordings will be used to confirm the validity of survey interactions.

Ex-post checks: airtime backchecks

- Accounting was done for airtime distributed during each survey round. Drivers signed a sheet to acknowledge receipt of the airtime at the end of the survey.
- During the first bus park survey, drivers who accepted airtime also signed the tablet, and the paper and digital lists of signatures were reconciled.
- During the second bus park survey, drivers only signed the paper form but enumerators were required to write down next to the signature a unique number that was randomly generated by SurveyCTO. The unique numbers helped to minimize any potential cheating by i) signaling to the enumerators that they were being closely monitored, and ii) creating a record to refer to if misuse of airtime cards was suspected.

Results of the Bus Park Compliance Survey Data Quality Checks (Pictures)

| Week of audit | Date of surveys | # Surveys audited | Type of Errors (error in compliance survey) | | Compliance number error rate | Type of Errors (error in audit process) | | | Audit process error rate | Total error rate |
|---------------|-----------------|-------------------|---|---------------------------|------------------------------|---|----------------------|---------------|--------------------------|------------------|
| | | | # incorrect condition indicated | # incorrect sticker count | | # only one side of vehicle captured | # poor photo quality | Auditor error | | |
| 1 | Jul 28 – Aug 3 | 88 | 7 | 5 | 14% | 2 | 3 | 1 | 6% | 20% |
| 2 | Aug 4 – Aug 17 | 115 | 3 | 9 | 10% | - | 1 | - | 1% | 11% |
| 3* | Aug 15 – Aug 25 | 455 | 17 | 35 | 11% | 3 | 25 | - | 6% | 17% |
| 4 | Aug 25 – Aug 31 | 212 | 7 | 18 | 11% | - | 5 | 3 | 4% | 15% |
| 5 | Sep 1 – Sep 7 | 208 | 3 | 10 | 7% | 2 | 2 | 1 | 2% | 9% |
| 6 | Sep 8 – Sep 15 | 209 | 5 | 7 | 6% | 2 | - | 3 | 2% | 8% |
| Total | | 1287 | 42 | 84 | 10% | 9 | 36 | 8 | 4% | 14% |

Incorrect condition indicated: when the enumerator failed to capture the actual condition of the sticker in the compliance check, due to personal divergences in what defines a damaged sticker.

Incorrect sticker count: when the enumerator indicated a sticker count for the vehicle not matching the sticker count that can be reproduced from the pictures.

Only one side of vehicle captured: when the pictures don't show the vehicle in its entirety and don't allow to reproduce the sticker count

Poor photo quality: when the pictures are not sufficiently readable to count stickers

Auditor error: when the auditor erroneously marked the survey as having an error. This usually occurred when the auditor did not see a sticker in the image or did not see fabric on the ceiling of the vehicle and thought stickers on the windows were incorrectly placed. These mistakes were caught through review by the research team.

*Twenty new enumerators were added to the field during this week, which explains increased, rather than decreased, total error rate.

RESULTS

| Bus Park Compliance Check Results | | | |
|---|-----------------------------|--------------------------------------|--------------|
| | Round I [April 2017] | Round II [July – August 2017] | Total |
| # of vehicles surveyed (consented) | 9,207 | 11,563 | 20,770 |
| # of vehicles approached | 9,227 | 11,600 | 20,827 |
| consent rate | 99.78% | 99.68% | 99.73% |
| Among all vehicles (buses and matatus) | | | |
| % vehicles with at least one sticker | 55.00% | 56.61% | |
| % vehicles with all stickers | 25.81% | 19.41% | |
| % vehicles with all but one sticker | 10.09% | 19.99% | |

Encouragingly, vehicles insured by Directline had compliance rates 3 to 8 percentage points higher than the vehicles covered by another insurance provider at the time of the bus park compliance inspections.

| Bus Parks Compliance Check Results by Insurance Company | | | | |
|--|----------------|---------|-----------------|---------|
| | Round I | | Round II | |
| | DLA | Not DLA | DLA | Not DLA |
| # vehicles | 5,433 | 3,774 | 5,952 | 5,607 |
| % at least one | 57.37% | 51.59% | 60.16% | 52.9% |
| % all stickers | 27.08% | 23.98% | 27.66% | 25.04% |

The compliance surveys also confirmed the estimate that DLA covers approximately 60% of the market share of PSVs.

The compliance rates observed from the bus park checks differ significantly from the 83% rate suggested by the most recent lottery. Although over 50% of observed vehicles have at least one sticker, which is encouraging in terms of distribution, the measure that is most comparable between the bus park check and the lottery is the “% of vehicles with all stickers,” which is only an average of 22.6% across the two rounds of checks. (Although the percentage is lower in the second round than the first, the share of vehicles that have all but one sticker doubles in the second round, suggesting that current distribution methods, particularly having *Zusha!* staff at each NTSA inspection center, have been effective, and the drop off in full compliance is likely due to expected wear and tear of the stickers.)

Observed rates of sticker saturation and retention from the bus park checks are closer to those observed among vehicles coming into the NTSA centers for inspection, further supporting the assumption that the lottery is an inflated estimate of full compliance.

Among the 10,533 vehicles surveyed by enumerators at the NTSA centers, 12.15% had a full set of stickers, and 29.84% had at least one sticker. As was discussed previously, these numbers are likely an underestimation of the number of vehicles with stickers just prior to inspection due to many vehicles being cleaned and painted.

Because distribution at the NTSA and the bus park checks were not randomized, there are reasons to believe that the sample of vehicles may be different along important characteristic that would affect their compliance. The first round of bus park compliance checks was conducted between the hours of 9am and 5pm. However, vehicles running longer distance routes, typically bigger buses, often leave the parks early in the morning. Therefore, in the second round of bus park checks enumerators arrived at the parks earlier to make sure more of these vehicles were capture.

In addition, data collection was expanded from 22 towns to 99. These implementation changes did not seem to significantly change the full compliance rates observed among surveyed vehicles, although double the share of vehicles found did have at least one sticker. The *Zusha!* team will continue to monitor and analyze the sensitivity of compliance rates to different factors over the course of the next several months.

V. IMPACT ANALYSIS

DATA SOURCES

There are two challenges to estimating the impact of the scaled-up program on accidents and related outcomes. The first relates to whether we can identify a credible empirical strategy that yields a causal estimate of impact. The second relates to how reliably we measure the key outcomes we use. We deal with the first of these challenges and then turn to measurement in the sections that follow.

Over the course of the three phases of sticker distribution by Directline, between 13 and 16 percent of vehicles that purchased insurance coverage were recorded as *not* receiving the *Zusha!* intervention (which represents, for a given phase, between 4,000 and 5,000 vehicles). The research team initially considered the possibility that the sales office staff might have continued to use the randomization code implemented during the second RCT in 2011-13, thus providing us with a new experiment.

However, upon review of the coverage and underlying sticker issue data, it was found that non-treatment was grouped in branch-specific episodes, and most likely reflected the fact that branches would turn off the prompting system when they ran out of inventory or for other reasons. This assignment process could limit our ability to meaningfully compare the accident rates of treated and untreated vehicles if stock-outs are non-random with regard to vehicle and driver quality.

Given the non-random determination of non-treatment, we turn to a generalized difference-in-differences strategy to measure the impact of the scale up. We focus on Phase I where the bulk of non-treatment vehicles are well identified.²

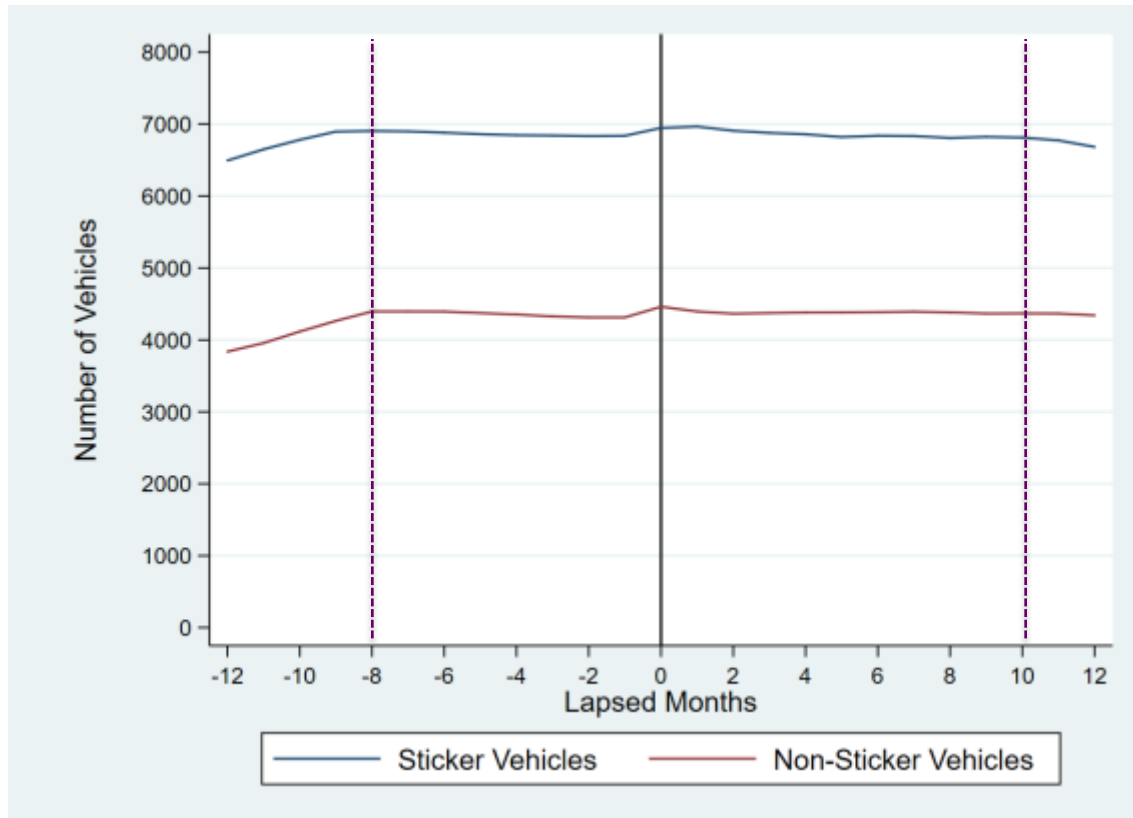
Our next challenge is in the measurement of accidents. Given that our distribution of stickers relies on one insurance company as well as the NTSA, our ability to observe all of the accidents affecting our study sample is severely limited by exit from DLA. Matatus have access to at least three other insurance companies that provide cover for exactly the same price as DLA. Over a long period of time, a moderate share of vehicles will purchase insurance from at least one of the other insurers. DLA records only accidents of vehicles that they cover. All accidents experienced by study vehicles while they are covered by other insurers are not observed by our team.

Our solution to this measurement challenge is to restrict the sample of vehicles and period of observation to maximize the chances that we observe a large share of accidents among a stable set of vehicles. In particular, as Figure 2.6 below shows, we restrict the sample to vehicles that have been covered for 75% of the time between January 1 2014 and December 31, 2016. Naturally this solution trades off lower measurement error in accident rates for both a smaller sample and one that is selected on loyalty to DLA. The smaller sample has implications for the precision of our estimates and potentially undermines the value of better measurement of accidents. The selection concern is arguably not as important given the context that we operate in.

² The absence of a reliable counterfactual undermines our ability to measure impact of Phases II and III. In particular, the number of vehicles with no stickers (and sufficient Directline coverage over the period) drops significantly to the point of lacking much statistical power to detect meaningful effects.

GRAPHS

Figure 2.6: Number of sticker/no sticker vehicles covered for 75% of observation period



of vehicles in month 0 = 7,311 (non-sticker vehicle = 4,852)

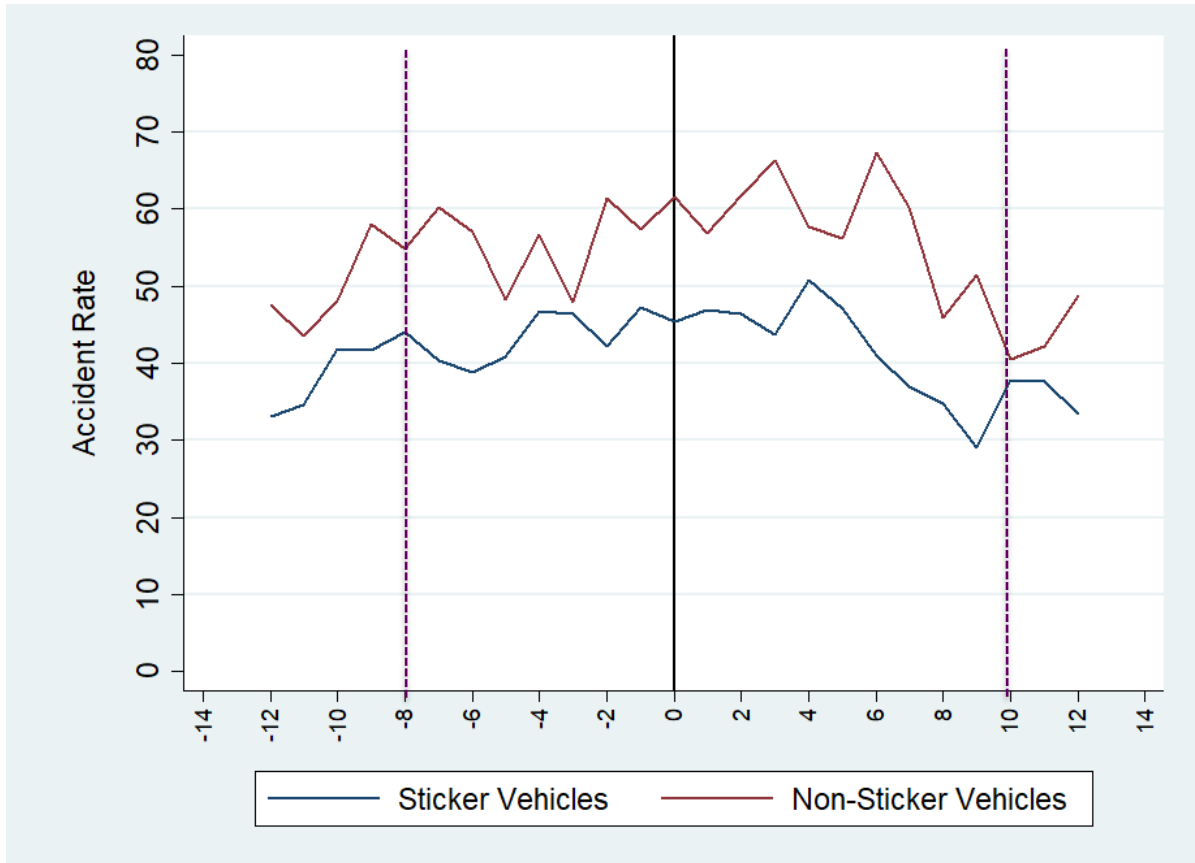
The figure suggests that about 8 months before until 10 months after recruitment (lapsed month=0 corresponds to month of recruitment)³ the number of sticker/no sticker vehicles is relatively constant. This is encouraging as it suggests that inferences are less likely undermined by systematic entry/exit of vehicles in each category of vehicles.

Given the limitations and assumptions outlined above, we focus on our impact measurement on vehicles that were sold coverage during Phase 1 of the sticker distribution. We use a census of all accidents recorded by DLA during this period to specify our measure of accident rates. Given that our study sample is restricted to vehicles observed at least 75% of the time, our measure of accidents is much more accurate than in the full sample of vehicles.

Figure 2.7 suggests that vehicles that received stickers during Phase 1 tended to experience fewer accidents than those that did not, but this difference was present both before and after the intervention. Over the period during which the sample is reasonably well balanced, the difference in accident rates is somewhat smaller in the six months before than in the six months after.

³ For non-sticker vehicles, the date of recruitment corresponds to the first date the vehicle is observed purchasing insurance cover during the sticker issue phase.

Figure 2.7: Accident rates before and after exposure to stickers (lapsed time), Phase I



Calculating lapsed_months averages using data from Jan 1, 2014 - Dec 31, 2016; using only those vehicles that were insured for at least 75% of the days during this period (822 days out of possible 1096).

Crucial for this analysis, it does not appear that there are important and large trend differences before recruitment across sticker and non-sticker vehicles.

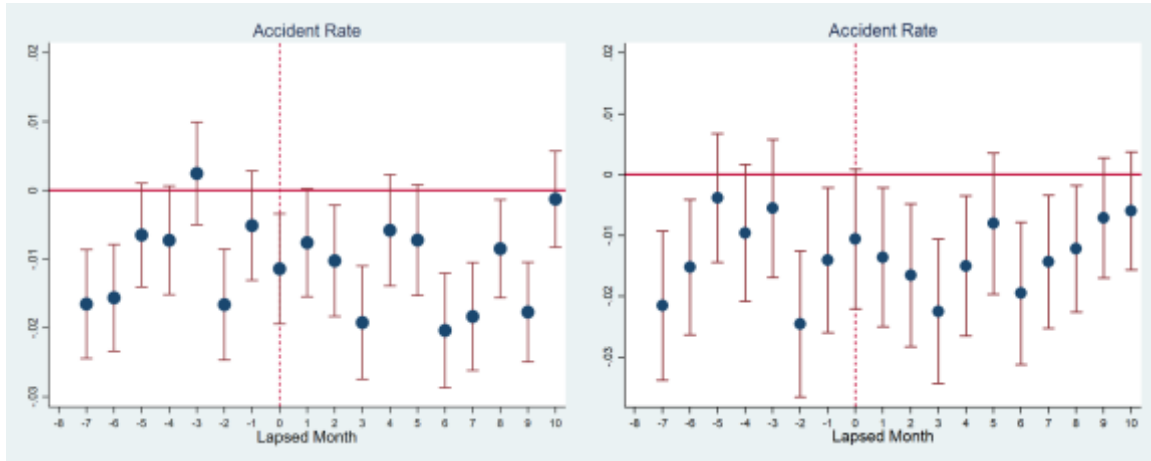
In order to estimate whether the observed differences are statistically different from zero, we run the following specification at the vehicle month level.

$$y_{it} = \sum_{t=-8}^{t=10} \delta_t M_t + \sum_{t=-8}^{t=10} \gamma_t M_t * D_i + \varepsilon_{it}$$

where y_{it} is an indicator variable equal to 1 if vehicle i has had an accident in lapsed month, $M_t \cdot D_i$ is a dummy variable equal to one if the vehicle has stickers and zero otherwise. The set of coefficients γ_t now define the time profile of the impact of the stickers. This specification allows us to examine the pattern of these impact over time, including any persistence or waning of its effects. The implicit counterfactual is that accident rates of vehicles with stickers have the same trend as the non-sticker vehicles (defined by the family of parameters δ_t) in the absence of the reform (before time 0).

Figure 2.8 below plots the trajectory of γ_t over time. The panel on the left is drawn from the specification above. The panel on the right includes controls for within-year variation in accident rates.

Figure 2.8: Impact of Zusha! Phase I scale-up



While sticker vehicles are more likely to have a lower monthly accident rate in the period after stickers are inserted, this could be partly explained by the lower pre-treatment differences observed.

LONG-TERM EFFECTS

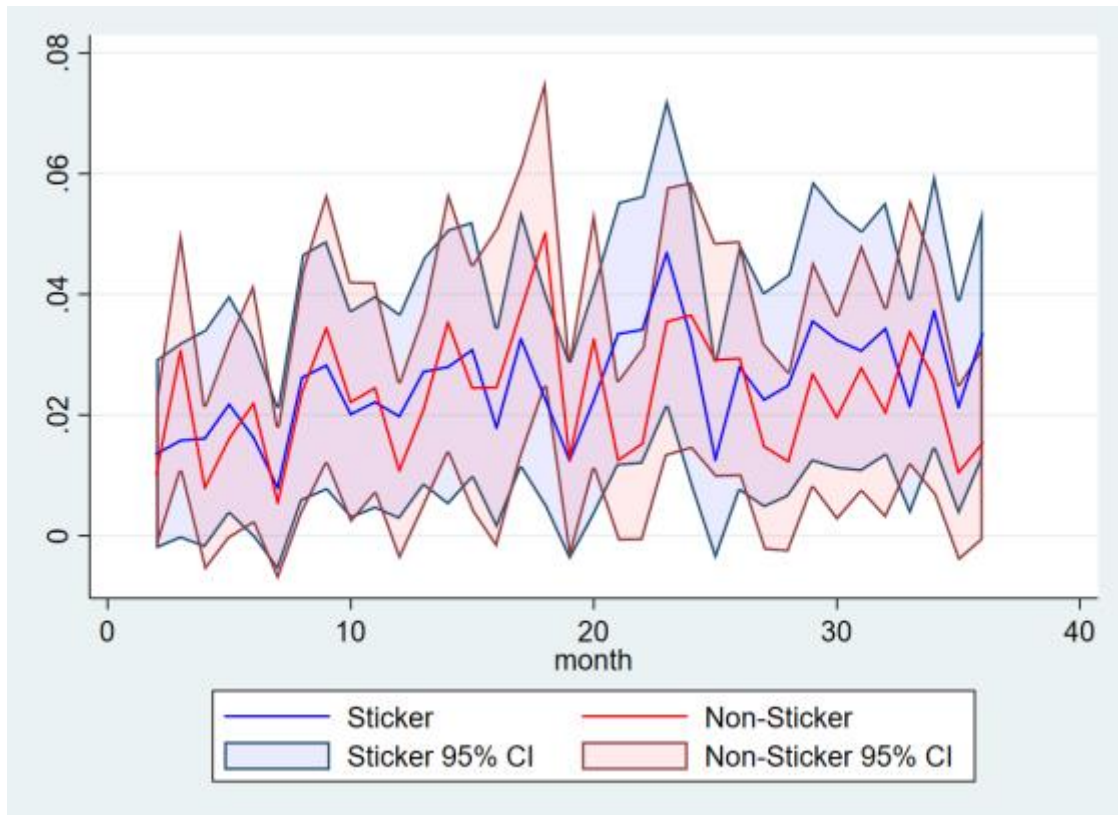
Over the long term, the impacts of the sticker intervention could be sustained if they induce a change in what is deemed to be acceptable driving practice on the one hand, or legitimate consumer demands on the other. Such behavioral changes at the driver level, and especially at the passenger level, are not likely to be tied to particular vehicles, as drivers change vehicles on a regular basis, and passengers do so daily.

Nonetheless, a comparison of recent claims data for vehicles recruited in the two early RCTs was carried out to investigate the possibility that the interventions could have had long-lasting effects. Data on claims from January 1 2014 to December 31 2016 was analyzed, during which period some 57 percent of vehicles from the first RCT and 73 percent of those from the second were observed.⁴ Attrition from the samples was balanced across treatment and control groups.

Figure 2.9 illustrates the claims rates for treatment and control groups in the Heckle and Chide study, 5-7 years after the intervention. There is clearly no difference between the rates, and the 95 percent confidence intervals overlap to a high degree.

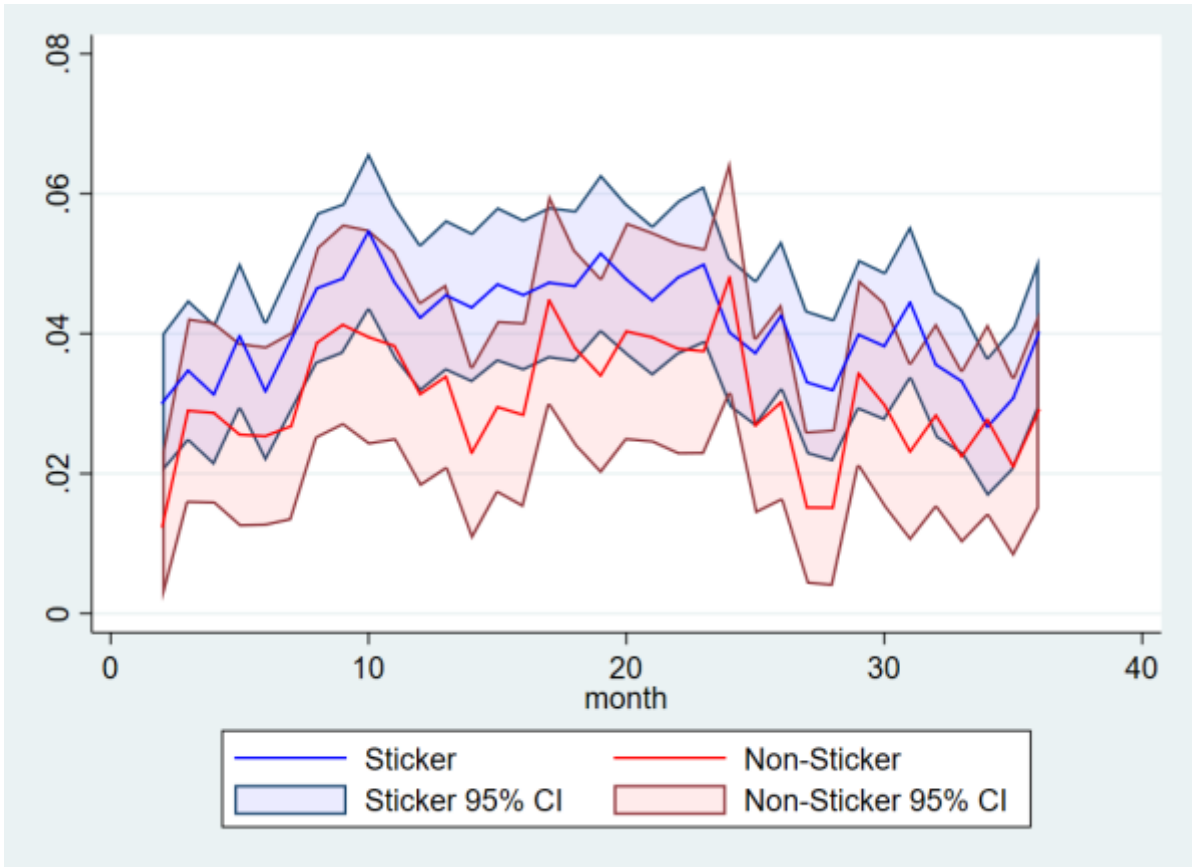
⁴ It is important to note that while a considerable share of the study sample obtain insurance at DL at least once during this follow-up period, we don't observe accidents that are covered by other insurance companies during this period. We have no reason to believe however, that the likelihood of unobserved accidents is different across treatment arms.

Figure 2.9: Long-term follow-up of Heckle and Chide study vehicles



We repeat the same exercise for the more recent and larger RCT conducted in 2011-2013. However, we drop the placebo study arm and focus on the group of vehicles that got any stickers vs the control group. Figure 2.9 shows a consistent difference in claims between the treatment and control groups of the original *Zusha!* study, with those in the treatment group exhibiting somewhat higher rates four years after the intervention. However, as reported in that study, the treatment and control groups exhibited imbalance in their historical claims rates at baseline (Habyarimana and Jack 2015). The baseline difference observed at the beginning of 2011 corresponds to the persistent difference observed 18 months after the last set of stickers was inserted. While it suggests that the stickers do not have a lasting impact on accident rates long after they have been inserted, this congruence validates the empirical strategy adopted in the write up of the results.

Figure 3.0: Medium term follow up of Zusha! study vehicles



VI. FUTURE STRATEGY

NTSA

gui²de has had extensive discussions with NTSA leadership about the feasibility of further incorporating *Zusha!* sticker distribution and compliance monitoring into the Authority's standard inspection process to ensure sustainability of the program. Currently, the NTSA is transitioning from using a paper form used to record data during its vehicle inspection process to a tablet-based digital platform (TIMS). The *Zusha!* team has proposed that the Authority add a module into the digital survey that collects information about stickers. In addition, the NTSA would gradually take over the sticker distribution process as part of their inspection duties. Because the NTSA's MVI survey already collects the other data points of interest to the research team (seating capacity, insurer, SACCO membership, etc.), only a few new questions would need to be added. In steady state, *Zusha!* might no longer employ its own staff members at each of the centers to distribute stickers and collect data – this could be done entirely by the NTSA, but with frequent training and oversight by the *Zusha!* team.

The Authority's legal department has determined that its current mandate would not allow it to make *Zusha!* stickers a regulatory requirement; such a change would require an act of Parliament. However, NTSA leadership has indicated that they are still willing to distribute stickers and collect information about compliance of vehicles during the inspection process through TIMS. Though this would mean that a vehicle would be able to pass inspection and obtain a medallion if it refused stickers, such institutional endorsement would significantly increase the sustainability and salience of the intervention. The language of the TIMS proposal can be found in Appendix A.

In addition to the specific TIMS proposal discussed above, *gui²de* and the NTSA are currently negotiating an MOU to further define and codify the long-term institutional partnership. The final, agreed-upon version of this document, a draft of which can be found in Appendix B, will be presented at the Authority's next Board meeting, in December of 2017, for official endorsement.

DIRECTLINE

Despite the challenges of the lottery administration, Directline continues to be an integral partner. With an approximately 60% share of the market for PSV insurance cover at any given time, they offer a large, reliable channel through which to distribute stickers and reach vehicles. They have now funded three lottery licenses and paid over \$45,000 in lottery license and prize money.

Most importantly, Directline is an invaluable source of sticker issue and accident data, as it provides access to highly disaggregated and confidential data on more than half the country's PSVs. Currently, it is the only source of accident data the *Zusha!* team has in Kenya. Future engagement with the company could include presentation of the results of the most recent scale-up to the Board of Directors, to cement the already strong partnership.

While Directline is currently the most reliable source of accident data, it appears the NTSA will be incorporating accident reporting into the TIMS system. Under the anticipated collaborative agreement between the NTSA and *gui²de*, data collection and management would be designed to enable continued monitoring of the *Zusha!* intervention, albeit in a non-experimental context.

VII. APPENDIX

APPENDIX A: NTSA TIMS PROPOSAL

NTSA- *gui²de*-East Africa Collaboration on Road Safety in Kenya

I. Background

Zusha! is a road safety intervention aimed at improving the behavior of PSV drivers in Kenya. Stickers encourage matatu and bus passengers to complain directly to their drivers if they feel unsafe. The program, funded by external donor support, has been experimentally tested by researchers from Georgetown University, and shown to have reduced PSV accidents by between 25 and 50 percent.

Since 2013, the NTSA has collaborated with Georgetown's office in Nairobi, *gui²de*-East Africa, to scale up *Zusha!* across Kenya, with the goal of reaching all PSVs in the country. Stickers are delivered through the NTSA's 17 inspection centres, as well as at Direct Line Assurance sales offices. As of July 2017, stickers have been distributed to over 40,000 PSVs.

Ensuring sticker retention is a challenge, as drivers and/or passengers are tempted to remove them. In response, we administer a weekly lottery, under which the drivers and owners of randomly selected PSVs win cash prizes if the issued stickers are in place. The raffle is administered under a license issued by the Betting Control and Licensing Board.

II. Proposal for Consideration

The lottery functions as a positive incentive for drivers to put the stickers in their vehicles and retain them. However, because insurance is often purchased by a third party such as an agent, the drivers may not always receive the stickers. In addition, Direct Line does not insure all PSVs operating in Kenya. Compliance checks conducted by the *Zusha!* research team confirm that stickers are not reaching all vehicles.

We would therefore like to continue working with the NTSA towards universal adoption and to ensure that all licensed PSVs be fitted with *Zusha!* stickers on a continuing basis. Currently, *Zusha!* has staffed each NTSA inspection centre with a *gui²de*-East Africa employee who distributes stickers to and collects information from vehicles as they come through for annual inspection.

For the purposes of long-term sustainability, we would like to work towards a model in which *Zusha!* is more closely integrated into the NTSA's standard operations, and is implemented fully by NTSA staff. While recognizing that making the stickers required is currently beyond the scope of the NTSA's legal mandate, we would like to explore how *Zusha!* sticker distribution and data collection can be incorporated into the annual inspection process.

II. Integrating *Zusha!* into TIMS

We propose that a short module be added to TIMS to collect information about *Zusha!* stickers, and prompt the NTSA Inspectors to insert stickers in the appropriate place inside PSVs and make sure they leave with a full set in place.

The module should contain a set of questions that are programmed to collect the following information.

1. Number of stickers in place upon arrival
2. Number of stickers inserted by the Inspector
3. Number of stickers in place at departure

Though drivers would be free to refuse the stickers and the completion of the *Zusha!* TIMS module would not impact the issuance of the inspection medallion, the ability to reliably collect annual data about *Zusha!* sticker retention and issuance for all registered vehicles in Kenya would be a significant achievement for the NTSA and the program, and would allow data to be easily exported and analyzed for impact assessment.

IV. Institutional Roles

- The design, printing, and shipment of stickers would continue to be executed and funded by *gui²de*, to the extent possible using its external grant resources.
- Stickers would continue to be freely available to PSV operators at NTSA inspection centres and Direct Line offices, and other distribution points as determined.
- *gui²de* will continue to provide training and support to NTSA inspection staff, and to help build both administrative capacity at the inspection centres, and analytical capacity at headquarters.
- NTSA staff at each of the 17 inspection centres will be instructed to distribute *Zusha!* stickers to PSV vehicles as part of the inspection process, and complete the *Zusha!*-specific TIMS module.
- On-going monitoring and evaluation of the campaign would be conducted by *gui²de*. To this end, relevant TIMS data would be shared with *gui²de* on a regular basis. In addition, information on road crashes involving both PSVs and other vehicles would be made available to *gui²de* for continuing impact assessment.

APPENDIX B: NTSA MOU

BACKGROUND

The National Transport and Safety Authority was established through an Act of Parliament on 26th October 2012. The government's objective in forming the Authority was to harmonize the operations of the key road transport departments, to help in effectively managing the road transport sub-sector, and to minimize the loss of lives through road crashes.

The Georgetown University Initiative on Innovation, Development, and Evaluation (*gui²de*) conducts empirical field-based research in developing countries. *gui²de*'s Kenya office, known as *gui²de*-East Africa, implements a road safety program called *Zusha!*, a cost-effective intervention that places stickers inside Public Service Vehicles (PSVs) to encourage passengers to speak up directly to their drivers against bad driving. Following two highly successful randomized control trials (RCTs) between 2007 and 2013, which showed that PSVs in which *Zusha!* stickers were placed had between 25-50% fewer insurance accident claims, Georgetown received external funding to scale up the *Zusha!* intervention nationwide in Kenya, and initiate research trials to Tanzania, Rwanda, and Uganda.

gui²de-East Africa has collaborated successfully with the NTSA in scaling up the *Zusha!* road safety campaign since 2015.

PURPOSE

Both *gui²de*-East Africa and NTSA agree that they wish to continue collaborating on the implementation and scaling of the *Zusha!* program. The purpose of this MoU is to identify the NTSA as an integral partner in this work and outline basic principles and responsibilities that will govern the future collaboration between the *Zusha!* research team and NTSA staff.

The Parties would like to work together towards universal adoption and to ensure that all licensed PSVs be fitted with *Zusha!* stickers on a continuing basis. Currently, *Zusha!* has staffed each NTSA inspection centre with a *gui²de*-East Africa employee who distributes stickers to and collects information from vehicles as they come through for annual inspection.

For the purposes of long-term sustainability, the Parties would like to work towards a model in which *Zusha!* is more closely integrated into the NTSA's standard operations, and is implemented fully by NTSA staff. While recognizing that making the stickers obligatory is currently beyond the scope of the NTSA's legal mandate, other options to further incorporate *Zusha!* sticker distribution into the annual inspection process will be pursued.

Specifically, the Parties will work together to transition the sticker distribution process to NTSA Inspectors, who will place stickers inside all PSVs during their annual inspections. NTSA will also update the TIMS platform to include questions about *Zusha!* stickers, which the Inspectors will complete during inspection.

ROLES AND RESPONSIBILITIES

The Parties intend to collaborate on the *Zusha!* program as detailed below. Each Party will cover the costs associated with their respective activities. No money will be transferred between *gui²de*-East Africa and NTSA.

***gui²de*-East Africa commits to:**

- Design, print, and ship the stickers to all 17 of NTSA's inspection centers;
- Regularly train NTSA staff on *Zusha!*-related tasks and continue to help build both administrative capacity at the inspection centers, and analytical capacity at Headquarters;

- Conduct ongoing monitoring and evaluation of the *Zusha!* campaign, and share impact assessment results with NTSA leadership.

NTSA commits to:

- Grant rights to apply/use the Authority's logo on the program communication materials, subject to approval of all artwork and digital content;
- Develop and launch a *Zusha!* data collection module on the TIMS system;
- Allow the NTSA staff at each of the 17 inspection centres to be trained by *gui²de*-East Africa to distribute *Zusha!* stickers to PSV vehicles as part of the inspection process, and complete the *Zusha!*-specific questions in the TIMS module;
- Share relevant TIMS data with *gui²de*-East Africa on a regular basis, including information on road crashes involving both PSVs and other vehicles to facilitate continued impact assessment;
- Endorse the project as may be necessary.