Evaristus Peter Makota and Stephen Mathew Kibusi

Abstract: Informal training on approaching road traffic injuries has become increasingly important in strengthening health care provision in pre-hospital care. Despite, evidence-based practice on formal training for emergency care, as well as health policy in Tanzania on addressing those issues. Informal training is not anymore implemented in routine practice especially for first responders like commercial motorcyclists to address road traffic injuries. Study involved two hundred fifty two participants randomly selected from registered parking points and the results of the study showed that majority of the participants had low knowledge and skills on basic life support. But most of them had attended victim with road traffic accidents and tends of traffic violation also revealed. Study concluded that, the intervention was effective and relevant to the commercial motorcyclists.

Subjects: Environment & Agriculture; Bioscience; Food Science & Technology; Health and Social Care; Medicine, Dentistry, Nursing & Allied Health

Keywords: Effectiveness; training manual; basic life support; commercial motorcyclists; road traffic injuries

ABOUT THE AUTHOR
Evaristus Peter Makota, a Master holder of “Master of Science in Nursing Education” from The University of Dodoma as a Principal investigator is very interested in Public Health issues. In collaboration with Stephen Mathew Kibusi, PhD Holder we managed to prepare and conduct an intervention research on addressing the issue of road traffic injuries to the road users. The research reported in this paper relates to wider projects dealing with sustainable development goals.

PUBLIC INTEREST STATEMENT
Road traffic accidents and injuries affect millions of people in all years; it is a disaster in financial, medical and community terms. This perspective article describes one of the best interventions in addressing the identified public health problem, road traffic injuries disability and deaths to the road users by imparting knowledge and skills on basic life support to the selected first responders, “commercial motorcyclists” who serving transport of passengers within the growing and developed cities across the country particularly Tanzania and then after being used with other developing countries. This study, in turn will help in improving socio- economical development through maintaining and restoring health of the communities. Exploration of road traffic injuries interventions can also help government and non-government organizations to assist communities and individuals in reaching their family goals of development and finally being a portal for policy development.
1. Introduction
The formal learning system in Tanzania, as in other countries characterized by specified curriculum with clearly set of standards. For instance, in addressing emergency care among casualties, these curricula stipulate the all necessary subject-matters to health professionals in dealing with the victims of road traffic injuries. But once the road traffic accidents happen, the first responders are always community members with no basic knowledge and skills to attempt pre-hospital care prior for medical care. And also this lead to death due to severe bleeding, shock and difficulty in breathing which all needs immediate rescue. In turn, raise the need of informal training (Livingstone, 2006).

However, the problem of the road traffic injuries fatalities affecting many countries including Tanzania. It is highly affected developing countries in East Africa and Africa in general with road traffic accidents and injuries (Peltzer, 2011). In 2010, the country had the road traffic death rates of 22.7 per 100,000 (Haulle & Kisiri, 2016). The road accidents are rising day after day for case in point, in 1977–2008 there was about 379, 699 accidents with 48, 754 fatalities and 347, 657 people injured while leaving substantial damages to property. The problem had several impacts to the community includes; loss of man-power especially active age group of people for production, mental and physical disabilities and permanent dependence (Msava, 2013).

Traffic disorganization, failure in vehicle inspection, poor maintenance conditions, reckless and drunken driving as well as impurity of infringers, significantly contribute to the occurrence of traffic accidents especially involving motorcyclists. In addition, the use of cellular phones while riding, driving without valid license, passing traffic red light and U-turn also were reported to contribute on occurrence of road traffic accidents (Chiduo & Minja, 2001; Ministry of Home Affair, 2016).

The government of Tanzania addresses this problem by endorsement of Motorcycles Licensing Regulations in 2009 through conducting education sessions on road safety and raising public awareness using radio and television. Also distribution of fliers and implementing both first and second phases of national road safety operations and road safety week campaigns (Daily News, 2018; The Citizen, 2017). Despite these interventions, the problem still persists and increasing whereby road traffic injuries and fatalities to 43–56 aged adjusted death rate per 100,000 (World Life Expectancy, 2017) whereby economically active age group with 18–45 years are more affected and most of them died due to delayed pre-hospital care (Boniface, Museru, Kiloloma, & Munthali, 2016).

Hereby, the problem of road traffic injuries fatalities should be tackled by introducing intervention thus is, participatory training to the commercial motorcyclists as these are the most first responders in road traffic accidents and more affected with this situation (Zimmerman, Jinadasa, Maegga, & Guerrero, 2015). This intervention relied on in pre hospital care to the victims with road traffic accidents using basic life support approach from a developed training manual which was focused in imparting techniques for initial assessment, opening an airway and providing bystanders chest compression (Arbon & Hayes, 2007).

Because death can be potentially preventable in at least thirty nine per cent of those who died from accidental injury before they reached hospital (Hussain & Redmond, 1994). This study therefore, aiming at evaluating the effectiveness of participatory training on basic life support among commercial motorcyclists by assessing if there is a significant change in knowledge and skills, as well as satisfaction from the participants. Moreover, the information gathered is beneficial to commercial motorcyclists and other road users for the aim of reducing road traffic injuries fatalities in Tanzania.
2. Methods

2.1. Aims
The study aimed at evaluating the effect of participatory training in improving knowledge and skills on basic life support among commercial motorcyclists as a first responders in road traffic accidents.

2.2. Study design
A quasi-experimental design (Single group) with a quantitative approach was used to evaluate the effectiveness of the participatory training for the ultimate purpose of reducing road traffic fatalities (Polit & Beck, 2008; Varkevisser, Pathmanathan, & Brownle, 2003).

2.3. Study setting
This study carried out in Dodoma City, the fast growing city with highly road traffic roadway in Tanzania, whereby commercial motorcyclist industry contributing significant means of transportation which accompanied by increasing number of accidents (Atubi & Onokala, 2009; Dodoma Roads Network, 2016).

2.4. Participants
Registered commercial motorcyclists offering their services in Dodoma city were involved. Total of 886 commercial motorcyclists were already registered at a time of data collection. Those registered with no willing to participate voluntarily were not included in the study.

2.5. Sample size determination and procedure
Sample size of 268 obtained using formula by Krejcie and Morgan \( s = X^2 \frac{NP ((1-P)/d^2 (N-1) + X^2P (1-P)}{(N-1)(Krejcie & Morgan, 1970).} \)

Where by:

\( s = \) required sample size

\( X^2 = \) the table value of chi-square for one degree of freedom at the desired confidence level (3.481)

\( N = \) the population size (886 Registered Commercial Motorcyclists in Dodoma Municipal)

\( P = \) the population proportion (assumed to be 50% since this would provide the maximum sample size (0.5)

\( d = \) the degree of accuracy expressed as a proportion (0.05). This is the margin of permissible error between the estimated value and the population value, it is amount of errors that are willing to tolerate in this sample estimates

The participants from their 44 registered parking were obtained randomly using lottery approach, whereby the required participants from registered parking points were determined proportionally.

\[ \text{Required Participants} = \frac{\text{Total number of study participants in each parking point}}{\text{Total number of participants in all parking points}} \times \text{Sample Size} \]

Forty-four boxes were prepared equal to the total number of parking points and each box represented one parking point whereby the pieces of papers were kept in, corresponding to the number of registered commercial motorcyclists in those parking points. These pieces of papers numbered according to the required sample size from that parking point as determined proportionally. Then, participants told to pick up one piece of paper after the box shaken vigorously to ensure randomization. Then, required sample of study and the numbers recorded. The participants belonging to these numbers constituted the sample size from that parking point.
2.6. Instruments
Our primary outcome variables were knowledge and skills. Knowledge questions on basic life support with the score of low knowledge <3/11 reasonable, 4-6/11 and high ≥7/11 were adapted from Roshana and Batajoo (Roshana, Batajoo, Pirziani, & Sharma, 2012) with modified option based on 2005 European Resuscitation Council basic life support. A Skill was assessed using Simulation Scenario with Reviewed Guided questions converted from basic life support checklist (Bete, 2017). Reviewed questions were added from St. Andrew’s Ambulance Association 2001, St. John Ambulance, 1992 with score of low skills accounts for <3/10 reasonable, 4-6/10 and high ≥7/10.

Satisfaction of commercial motorcyclists towards basic life support training, adapted and modified from student satisfaction questionnaire by Leonard da Vinci and modified based on Kirkpatrick’s training evaluation scale for satisfaction items and scoring (Diener, Emmons, Larsen, & Griffin, 1985). Whereby each level scaled by indicator of points; Strong Agree weighs for 7 points, 6 points for Agree, 5 points for Slightly Agree, 4 points for Neither Agree nor Disagree, 3 points for Slightly Disagree, 2 points for Disagree and 1 point for Strongly Disagree. Items are scored based on range from 44 – 49 points termed as extremely satisfied, 38 – 43 points was in satisfied level, slightly satisfied range from 32 – 37 points, 26 – 31 points accounts for neutral, while 20 – 25 points was grouped as slightly dissatisfied, 14 – 19 points as dissatisfied and 8 – 13 points categorized as extremely dissatisfied.

2.7. Intervention
The intervention implemented within this study was participatory training on basic life support using a training manual to commercial motorcyclists. Intervention was implemented into three phases involved both theoretical and practical sessions.

2.7.1. Pre-intervention phase
In this phase, assistants’ researchers were trained on sampling procedure, data collection and effective facilitation skills, understanding level prior for intervention was assessed. Sampling procedures carried out in their respective registered parking points. Highly consideration made on practical experimental evidence for a few thirty five cases to see routinely on how they usually carried out this intervention. However, the influence of gender was not affecting the outcome of the study. For selected sample were invited to respond on pre intervention questionnaire with three sections; demographic characteristics, BLS knowledge and lastly BLS simulation scenarios were administered to the agreed and signed participants and this was controlled under invigilation approach.

2.7.2. Intervention phase
Intervention conducted was workshop training from 13 to 27 April 2018, whereby total of 252 participants and 3 facilitators were involved and grouped into seven groups of not less than forty participants group. Training conducted hourly to every group in a day sessions, whereby one training unit roofed in each day starting from 8 a.m. to 4 p.m. after signing the attendance sheet.

In theoretical part of the training, participatory approaches of small group discussion, role play, simulation and case study were used as stipulated in the training manual which gives participants room for free participation on the facilitated subject matters. On the other hand, practical sessions were also implemented in two aspects; simulation on bystanders cardiopulmonary resuscitation (chest compression) using CPR Mankins and standardized patients (Flint, Kelly, Mandel, Newell, & Stapleton, 1993). Casualty lifting was another aspect of the practical intervention conducted, in this part participants demonstrated how to lift casualties from the injury scene to the stretcher or transport vehicle, whereby standardized patient approach used.

2.7.3. Post-intervention phase
This implemented by administering post-intervention questionnaires in a single venue with sections of the same questions of BLS, knowledge and skills and satisfaction. The questionnaires administered a three-day after intervention as adult learning theories stated that, adult learner is
able to recall 90% after three hours and 70% after three days. BLS skills were assessed using the same simulation scenarios to identify the skills gained during the training.

2.8. Intervention program
The training manual was developed under the philosophical foundation of “Essentialism”, which aimed at promoting the intellectual growth of individual to be a competent person and abided to five key elements of training program effectiveness (Kunche, Puli, Gunigati, & Puli, 2011). These include; training environment whereby knowledge and skills were used to determine whether the training was effective or not. Training design and development in this element knowledge and skills to be delivered were also identified.

And Kaufman Roger’s Model used for the issue of need assessment of having this manual to address the discrepancy between the current status and desired status in availability of informal training in basic life support to road traffic injuries. Training delivery element involved some set of activities and methods to evaluate training while training implementation observed in the actual intervention of the study. Finally, training evaluation whereby training was assessed to what extent the training and development efforts contribute to improved performance and result and was achieved using Kirkpatrick evaluation model, level two (learning) through comparison of test performance (pre- & post-test).

Training manual composed of units, introduction to first aid, communication skills in emergency situation, common road traffic injuries, basic life support and transportation of casualty with two hundred seventy five training hours with participatory approaches as shown in Table 1.

2.9. Design of the implementation evaluation

2.9.1. Evaluation frameworks
The implementation evaluation was guided by the three levels of Kirkpatrick’s model of training evaluation. Level 1 which is reaction, measures how trainees (the people being trained), reacted to the training. Level 2 which is learning, measure what trainees have learned and Level 3 Behavior evaluates how far trainees have changed their behavior based on the training they received (Baskin, 1999; Devi & Shaik, 2012).

| Table 1. Basic life support training contents |
|------------------------------------------------|
| **Unit**                                         | **Facilitated by** | **Contents**                                      |
|------------------------------------------------|--------------------|---------------------------------------------------|
| **Unit 1: Introduction to first aid**            | Assistant Researcher 1 | • Concepts of first aids  
|                                                   |                     | • Aims of first aids                              |
| **Unit 2: Communication skills in emergency situation** | Assistant Researcher 2 | • Definition of communication  
|                                                   |                     | • Communication process  
|                                                   |                     | • Communication skills  
|                                                   |                     | • Emergency communication and notification       |
| **Unit 3: Management of Common road traffic injuries** | Assistant Researcher 3 | • Bleeding, shock, fracture, back and neck injury, obstructed airway and unconsciousness |
| **Unit 4: Basic life support approaches**        | Assistant Researcher 2 | • Concept of basic life support  
|                                                   |                     | • Elements of basic life support  
|                                                   |                     | • Bystander’s cardiopulmonary resuscitation       |
| **Unit 5: Transportation and salvage of road traffic injuries victims** | Assistant Researcher 1 | • Casualty lifting  
|                                                   |                     | • Source of transport  
|                                                   |                     | • Salvage                                           |
2.10. Data analysis

Data were analysed using IBM Corp. Released 2017. IBM SPSS Statistical for Windows, Version 25.0. A number of significance tests; one sample t test and paired t tests were used to confirm whether the observed differences among compared groups or association between variables were true or by chance as shown in Table 3. A p-value of 0.05 considered significant and several statistical assumptions were considered and observed before running of statistical analysis. Some of the variables were transformed (dichotomized and computed) for further analysis and interpretation.

3. Result

3.1. Participation

Participants attended five training units (Median 8, and Mode 12). Almost more than half (62%) of the participants attended 4 sessions and 16% attended all 5 units. Only 6% did not attend any units. Response rate was 94% which was enough for analysis and reporting (Mugenda, 1999).

3.2. Socio-demographic characteristics

The findings from the current study show that, all participants were male, 252 (100%). The demographic variables age of the commercial motorcyclists, were found that a large sample falls between the ages of the 20–29 years which depicts 119 (47.2%), whereby the sample mean of age was 31.3, mode of 40 and median age was 30. Majority of the participants had primary level education, which accounts for 154 (61.1%). However, majority of them 233 (92.5%) did not attend basic life support training prior an intervention while most of them 171 (67.9%) already attended victim with road traffic injuries in duration of 12 months as shown in Table 2.

3.3. Effectiveness of participatory training

The current study reveals there is a difference in knowledge in pre- and post-intervention, whereby out of 252 respondents’ attempted pre-BLS knowledge assessment, 173 (68.7%) were in low level of skills, 75 (29.8%) reasonable level and only 4 (0.8%) in high level of knowledge on basic life support. And after training, 228 (90.5%) were found with high skills, only 24 (9.5%) in reasonable and no one (0%) found in low skills as shown in Figure 2. The difference observed between, pre intervention (M = 3.49, SD = 1.16) and post intervention (M = 8.94, SD = 1.24) knowledge was

| Table 2. Accident and motorcycling history |
|--------------------------------------------|
| Variables                                  |
| Variable categories                        |
| Variable categories                        |
| n  |
| %  |
| Attendings riding training                  |
| Yes                                       |
| 66                                        |
| 26.2                                      |
| No                                        |
| 186                                       |
| 73.8                                      |
| Ownership of motorcycle                    |
| Self-ownership                            |
| 75                                        |
| 29.8                                      |
| Employed                                  |
| 139                                       |
| 55.2                                      |
| Day worker                                |
| 38                                        |
| 15.1                                      |
| Riding experience                          |
| 1–3 years                                 |
| 215                                       |
| 85.3                                      |
| 4–6 years                                 |
| 30                                        |
| 11.9                                      |
| 6 years and above                         |
| 7                                         |
| 2.8                                       |
| 1–3 years                                 |
| 215                                       |
| 85.3                                      |
| Attending road traffic accident victim     |
| Yes                                       |
| 171                                       |
| 67.9                                      |
| No                                        |
| 81                                        |
| 32.1                                      |
| Attending BLS training                    |
| Yes                                       |
| 19                                        |
| 7.5                                       |
| No                                        |
| 233                                       |
| 92.5                                      |
| Road traffic accident exposure             |
| Yes                                       |
| 80                                        |
| 31.7                                      |
| No                                        |
| 172                                       |
| 68.3                                      |
statistically significant, $t(251) = -53.65, p < 0.001$. Thus, the post intervention knowledge score was statistically significantly higher than pre-intervention knowledge score with the effect size of $d = 4.0$. The trainee covariates were not confounding the intervention as shown in Table 4.

Also the study revealed that, there is a difference in skills in pre- and post-intervention, whereby in pre-intervention baseline skills, 174 (69.7%) were in low level of knowledge, 72 (28.6%) reasonable level and only 6 (2.4%) in high level of skills on basic life support and after training, 228 (90.5%) were found with high knowledge, only 24 (9.5% in reasonable and no one 0 (0%) found in low knowledge (Figure 1 below). The difference observed between, pre-intervention ($M = 3.55, SD = 1.21$) and post-intervention ($M = 8.28, SD = 1.04$) skills was statistically significant, $t(251) = -45.22, p < 0.001$. Thus, the post intervention skills score was statistically significantly higher than pre intervention skills score with the effect size of $d = 4.2$. The trainee covariates were not confounding the intervention as shown in Table 5.

### 3.4. Participant’s reaction towards participatory training

Majority of the participants 215 (85.6%) were satisfied with the intervention. Mean satisfaction score ($43.4 \pm 2.6$) was higher than the normal satisfaction score of 32.0, a statistically significant difference of 11.4 (95% CI, 11.1 to 11.7), $t(251) = 69.4, p < 0.001$. Satisfaction on individual assessed items shows, most of the areas respondents were satisfied with, but the training content

| Trainee’s variables | Regression coefficient(B) | t     | 95% CI        | p value |
|---------------------|---------------------------|-------|---------------|---------|
| Intercept           | 4.0                       | 3.04  | 1.41–6.602    | 0.003   |
| Age                 | -0.08                     | -0.39 | -0.50–0.33    | 0.69    |
| Marital status      | 0.52                      | 1.89  | -0.02–1.06    | 0.16    |
| Education level     | 0.083                     | 0.39  | -0.33–0.50    | 0.69    |
| Other occupation    | 0.09                      | 0.22  | -0.62–0.78    | 0.82    |
| Residence           | 0.18                      | 0.86  | -0.23–0.59    | 0.38    |
| Attending training before intervention | -0.15 | -0.36 | -0.96–0.66 | 0.71 |
| Riding experience   | 0.05                      | 0.18  | -0.57–0.69    | 0.85    |
| Ownership of motorcycle | 0.20 | 0.82 | -0.28–0.68 | 0.41 |

| Trainee’s variables | Regression coefficient(B) | t     | 95% CI        | p value |
|---------------------|---------------------------|-------|---------------|---------|
| Intercept           | 3.821                     | 2.89  | 1.22–6.42     | 0.004   |
| Age                 | -0.260                    | -1.22 | -0.67–0.15    | 0.22    |
| Marital status      | 0.40                      | 1.45  | -0.14–0.94    | 0.14    |
| Education level     | -0.25                     | -1.19 | -0.67–0.16    | 0.23    |
| Other occupation    | -0.18                     | -0.51 | -0.88–0.52    | 0.61    |
| Residence           | 0.14                      | 0.69  | -0.26–0.56    | 0.48    |
| Attending training before intervention | 0.37 | 0.89 | -0.44–1.18 | 0.37 |
| Riding experience   | -0.38                     | -1.20 | -1.02–0.24    | 0.22    |
| Ownership of motorcycle | 0.47 | 1.93 | -0.009–0.95 | 0.15 |
scored much than other areas, 218 (86.5%), followed by training objectives, 215 (85.3%). Some of the respondents were not satisfied, 76 (30.2%) by the relevance of the training and 68 (27.1%) were also not satisfied with duration of time set for training as shown in Figure 3 and 4.

4. Discussion
As far as we are aware, basic life support is one of the first pre-hospital interventions for saving life of road traffic accident victims, this paper describes the detailed evaluation of this participatory training for its effective, reach, adoption and implementation. Male motorcyclists were considered in the study
because believes and taboos of the people from Dodoma, looking commercial motorcyclists (Bodaboda) is for male and this makes all of the participants found in their registered parking points were male. The result from the study also reveals that, participants attending road traffic injuries victims while they had inadequate knowledge and skills in basic life support when helping these casualties. About one hundred seventy one participants, who agreed they attended victims of road traffic injuries. Third quarter had inadequate knowledge on basic life support in attending casualties involved in road traffic accidents, only few were already attending training of such kind. This indicates that, the magnitude of the problem is still high and threatens the safety of road users as majority of participants were not well trained to help those group of people who facing several impacts.

4.1. Summary of key findings

Table 6 summarizes the key success factors of the BLS-PT intervention and the accomplishment that need to be enhanced.

The evaluation of the participatory training on basic life support shows that the implementation was delivered as planned. The assessment of participation indicates was high. The attendance of group session was high, and overall program retention was also high.

4.2. Strengths of BLS-PT intervention

In this study, a majority of participants were willing to join the study. This could be due to increased high incidence of road traffic accidents caused by motorcycles (Chang & Yeh, 2006; Daily News, 2017). The intervention was delivered through five units as planned. In our study, the
training was perceived effective in equipping first responders with the knowledge and important skills required to help victims with RTA.

4.3. The importance of implementation evaluation

Our findings of the implementation evaluation shows that a participatory training on basic life support to assist commercial motorcyclist in reducing road traffic injuries and deaths is feasible and significant. The finding also is acceptable as measured by participants’ satisfaction.

4.4. Limitations

Our study has some limitations; Firstly, the behavior changes data reported in this study is limited to immediate outcome and not impact, hence should be used with caution in the aspect of retention rate. Secondly, skills assessed in simulation scenario approach again should be used with caution. Lastly, the study did not include control group for comparison.

5. Conclusion

This comprehensive implementation evaluation from the commercial motorcyclists shows that participatory training is effective and accepted in improving knowledge and skills on basic life support. The participants were satisfied with the intervention. The findings from this evaluation will guide future development, adaptation and implementation of basic life support training program.

Acknowledgements

We acknowledge the following individuals for developing this paper: Dr. Kibusi S, Dr. Emmanuel Ndulila, Dr. Boniventura Mpondo and Mr. Sima BF.

Funding

The authors received no direct funding for this research.

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Citation information

Cite this article as: Evaluating the effects of participatory training in improving knowledge and skills on basic life support among commercial motorcyclists: A quasi-experimental study in addressing road traffic injuries, Evaristus Peter Makota & Stephen Mathew Kibusi, Cogent Medicine (2019), 6: 1665937.

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