

Using baseline and formative evaluation data to inform the Uganda Helmet Vaccine Initiative

Douglas R. Roehler^{1,2,7}, Rebecca B. Naumann^{1,8}, Boniface Mutatina³, Mable Nakitto³, Barbara Mwanje⁴, Lotte Brøndum⁵, Claire Blanchard⁶, Grant T. Baldwin¹ and Ann M. Dellinger¹

Abstract: Motorcycles are an important form of transportation in Uganda, and are involved in more road traffic injuries than any other vehicle. The majority of motorcycles in Uganda are used as motorcycle taxis, better known locally as boda bodas. Research shows that a motorcycle helmet is effective at reducing a rider's risk of death and head injury. As part of the Uganda Helmet Vaccine Initiative (UHVI), researchers collected baseline and formative evaluation data on boda boda operators' helmet attitudes, beliefs, and behaviors to inform UHVI activities. Researchers collected data on motorcycle helmet-related attitudes and beliefs through focus group discussions and structured roadside interviews, and researchers conducted roadside observations to collect data on helmet-wearing behaviors. Of the 12,189 motorcycle operators and passengers observed during roadside observations, 30.8% of drivers and <1% of passengers were wearing helmets. The most commonly reported helmet-wearing barriers from the focus group discussions and structured roadside interviews were: (1) 'Helmet is uncomfortable', (2) 'Helmet is too hot', (3) 'Helmet is too expensive', and (4) 'Helmet is of low quality'. Researchers incorporated findings from the formative research into the UHVI campaign to increase motorcycle helmet use. Radio messages addressing helmet comfort and cost were widely aired throughout Kampala, Uganda. In addition, campaign staff held nine boda boda operator workshops, covering approximately 900 operators, in which the facilitator addressed barriers and facilitators to helmet use. Each workshop participant received a high-quality tropical motorcycle helmet. UHVI will continue to use a data-driven approach to future campaign activities. (Global Health Promotion, 2013; 20 Supp. 4: 37–44).

Keywords: health behavior, health promotion, injury prevention, motorcycle

Background

Road traffic crashes are a global public health problem contributing to an estimated 1.24 million deaths and 20 to 50 million injuries annually (1).

The global burden of these injuries and deaths is disproportionately distributed, with more than 90% of road traffic deaths occurring in low- and middle-income countries (LMICs) (2). Recent data show

1. Division of Unintentional Injury Prevention, Centers for Disease Control and Prevention, Atlanta, GA, USA.
2. McNeal Professional Services, USA.
3. Injury Control Center Uganda, Kampala, Uganda.
4. Global Helmet Vaccine Initiative, Kampala, Uganda.
5. Asia Injury Prevention Foundation, Hanoi, Vietnam.
6. International Union for Health Promotion and Education, Saint-Denis, France.
7. University of Michigan, School of Public Health, Ann Arbor, MI, USA.
8. University of North Carolina, Gillings School of Public Health, Chapel Hill, NC, USA.

Correspondence to: Douglas R. Roehler, University of Michigan, School of Public Health, Ann Arbor, MI, USA. Email: droehler@umich.edu.

that road traffic death rates in LMICs are approximately double those of high-income countries (1). Between 2000 and 2020, road traffic deaths are projected to decrease by close to 30% in high-income countries, but increase by more than 80% in LMICs (3). This projected increase in LMICs is expected to be, in part, due to increased urbanization and motorization (4,5). It is unlikely that these problems and trends will subside without substantial action. Recognizing this serious public health problem, multi-sectoral international agencies have called for immediate action in LMICs (2,6,7).

Uganda is one such country with rapid growth, increased motorization, and high road traffic death rates. The population of Kampala, Uganda's capital city, has increased by nearly 123% since 1991 (8). In addition, the number of newly registered vehicles (cars, trucks, and motorcycles) in Uganda has grown rapidly. In 2006, there were approximately 61,600 new vehicle registrations in Uganda, and as of 2008, more than 100,000 new vehicle registrations occur annually (9). Uganda's growing population and increased motorization, combined with a diverse mix of road users including pedestrians, bicycles, handcarts, motorcycles, buses, cars, trucks, and vans, make the road environment increasingly complex (10,11). In 2010, 2,954 people lost their lives on Uganda's roads, and Uganda had a road traffic death rate of 28.9 deaths per 100,000 population (1). About 17% of those killed on Ugandan roads were operators or passengers of two- and three-wheel vehicles, primarily motorcycles (1). When looking at two- and three-wheel motorcyclist fatalities in neighboring countries for which data are available—Kenya (7%), Democratic Republic of the Congo (15%), and United Republic of Tanzania (18%)—many similarities can be drawn between Uganda and its neighbors.

While motorcycles are an important and growing form of transportation in Uganda, motorcycle riders are subject to increased injury risks. Motorcyclists were in more serious (36%) and fatal (27%) crashes than any other type of road user in Uganda in 2009 (9). The majority of motorcycles in Uganda are motorcycle taxis, better known locally as *boda bodas*. Used by both locals and tourists, *boda bodas* are a quick means of transport and efficient at navigating around traffic congestion; however, they carry elevated injury risks. Galukande and colleagues (12) noted that *boda boda* operators are notorious

for disregarding traffic regulations, excessive risk taking, and overloading—factors that increase the risk of injury, including head injury.

Research shows that a motorcycle helmet can reduce a rider's risk of death by 42% and risk of head injury by 69% (13). Mandatory helmet laws, when correctly implemented and enforced, are effective at increasing motorcycle helmet use and thereby reduce motorcycle-related injuries and deaths (14). While a compulsory motorcycle helmet use law is in place in Uganda, enforcement is inconsistent, and helmet use is low (1). A 2006 Ugandan helmet use observational study found only 46% of motorcycle operators and less than 1% of passengers were wearing a helmet (15).

Efforts to increase helmet use among motorcycle taxi operators in Uganda are facilitated, in part, through the Uganda Helmet Vaccine Initiative (UHVI), a country-specific application of the Global Helmet Vaccine Initiative (GHVI) (16). The program was established by the Asia Injury Prevention Foundation with support from the FIA Foundation, the World Bank, the U.S. Centers for Disease Control and Prevention, and the International Union for Health Promotion and Education, among others. With high-quality helmets able to reduce the risk of injury and death (13), similar to an immunization to protect against infection, the helmet can serve as a 'vaccine' to protect against head injury. UHVI started in 2010 and is focused on facilitating and encouraging helmet use among *boda boda* operators in Kampala, Uganda.

The objectives of this study were to collect baseline and formative evaluation data to inform the UHVI campaign. Specifically, data were collected to: (1) determine the prevalence of motorcycle helmet use among *boda boda* operators and passengers; and (2) identify barriers and facilitators to motorcycle helmet use to inform UHVI media messages and activities.

Methods

Helmet observations

In order to assess the prevalence of motorcycle helmet use in Kampala, researchers selected 10 observation sites based on traffic flow and geographical representation and collected data from 7:00 am to 2:00 pm in January 2011. Locally trained research assistants observed motorcycle helmet use

for each boda boda operator and passenger. To strengthen validity, researchers only recorded motorcycles traveling in one direction on selected highways and feeder roads.

Structured roadside interviews

To assess boda boda operators' knowledge and attitudes related to motorcycle helmets, researchers conducted structured roadside interviews with boda boda operators from March to April 2011. Researchers performed face-to-face interviews at selected stages in Kampala. Boda boda operators are organized by 'stands' (or 'stages') throughout Uganda, which are generally located near trading centers where potential passengers are most abundant. Boda boda operators wait at stages for passengers and then typically return to their stage after each fare. In order to identify boda boda stages to include in the pool for sample selection, stages with adequate traffic flow were identified, and safety concerns for interviewers were assessed. Stages were sampled from the pool, ensuring equal geographical distribution throughout Kampala, and the number of operators to interview at each selected stage was determined by statistical power calculations and budget constraints. Interviewers approached boda boda operators at selected stages, and if the operator agreed to be interviewed, the interview was completed away from other operators, typically about 10 feet from the stage. Each interview took approximately 10 minutes to complete. The interview included both closed- and open-ended questions, and all questions were read aloud to the boda boda operator. Question topics included barriers and facilitators to helmet use, helmet ownership, cost of helmets, and knowledge of the motorcycle helmet law. Researchers did not obtain any personal identifying information. The interview tool was pretested to ensure question and response option clarity, and data collectors were trained in proper interview administration to enhance reliability. Locally trained research assistants also entered and cleaned the data.

Focus group discussions

In addition to the structured roadside interviews, researchers held focus group discussions to collect additional information on boda boda operator helmet

use in Kampala. Five focus groups were held, and each included eight participants from the five districts of Kampala. Researchers analyzed the recorded focus group conversations to identify important themes related to helmet use and non-use, cost, availability, helmet preferences, general safety issues, enforcement, and knowledge of the helmet law.

Data analysis

Researchers used EpiData software version 3.1 to enter the quantitative data (i.e. observational data and structured roadside interview data) and to assess completeness, consistency, and accuracy of the data. The data were then analyzed using SAS and SPSS software (SAS version 9.2. SAS Institute, Inc.; SPSS Inc. (2010) PASW SPSS for Windows, Rel. 18.0.2). Researchers transcribed and thematically analyzed the qualitative focus group discussion data.

Ethical clearance was obtained in Uganda from the Mulago Research and Ethics Committee, Mulago Hospital, and the Uganda National Council of Science and Technology. Researchers obtained consent from respondents who participated in the structured roadside interviews and focus group discussions. The identity of respondents was kept confidential. The study also satisfied the Centers for Disease Control and Prevention's Institutional Review Board requirements.

Results

Helmet observations

In January 2011, researchers observed 12,189 motorcycle operators and passengers. Helmet use was known for 7,488 motorcycle operators and 4,536 passengers (Table 1) and unknown for 165 riders. Table 1 shows the percentages of all motorcycle operators and passengers observed wearing a helmet. There were large differences between the proportions of operators and passengers who were wearing a helmet.

Structured roadside interviews

A total of 628 boda boda operators in Kampala completed interviews (Table 2). The majority of operators (71%; $n = 435$) reported having a helmet for their own use. Among those operators, most

Table 1. Helmet use among motorcycle operators and passengers, Kampala, Uganda, January 2011.

	<i>Number wearing helmets</i>	<i>Total number of operators/passengers observed</i>	<i>Percentage of operators/passengers wearing helmets (95% CI)</i>
Operators	2,285	7,488	30.5 (29.5–31.6)
Passengers	4	4,536	Unstable estimate

owned their helmet and about half reported that they ‘always’ or ‘nearly always’ wore their helmet (51%; $n = 220$). About 60% of those who owned their helmet reported paying less than 30,000 Ugandan shillings for their helmet (less than \$12 USD; results not shown in table). Among those with access to a helmet, the vast majority reporting wearing a helmet to be safe (76%; $n = 339$), or ‘because it is required’ (21%; $n = 96$). The four most common responses for not wearing a helmet were: (1) ‘Helmet is uncomfortable’, (2) ‘Helmet is too hot’, (3) ‘Helmet is too expensive’, and (4) ‘Helmet obstructs my vision’ (results not shown in table). When asked how they obtained their road safety information, boda boda operators ($n = 319$) most often reported the radio (51%), the newspaper (23%), and friends (23%). However, among those who reported that they ‘seldom’ or ‘never’ wore a helmet ($n = 68$), 40% reported that they obtained their road safety information from the radio and 31% from ‘leaders’ (results not shown in table). Of all boda boda operators who participated in the structured roadside interviews, the majority (74%, $n = 454$) knew about the helmet law and the majority had been stopped by police at least once for not wearing a helmet (55%; $n = 346$). Of those stopped by police for not wearing a helmet, 68% reported that they owned a helmet ($n = 239$; results not shown in table).

Focus group discussions

Many focus group discussion participants echoed findings from the structured roadside interviews that boda boda operators wear helmets to be safe and to prevent death. One participant said, ‘I was riding when suddenly a taxi from behind knocked me down and I fell off the motor bike. I think I was only saved because I had a helmet and so I must put a helmet on when riding.’ Another important finding from the focus group discussions that was not heard as often in the structured roadside interviews was

that low-quality helmets are a major concern for boda boda operators:

...We don’t wear helmets because instead of protecting us, [the helmet] falls to the ground... and before you know it, it has broken into many small and tiny pieces, so what type of helmets are those? Ever since it happened, I don’t wear it anymore.

Focus group participants also discussed that the helmets available for sale in Uganda are generally of ‘very poor quality’. Of the helmets available to them at the time of the study, they reported only trusting those made in Japan.

Discussion

Despite substantial evidence that motorcycle helmets are an easy and effective way to prevent injury and death during a motorcycle crash, many boda boda riders in Kampala continue to ride without them (13,17). We found that less than a third of operators and almost no passengers wore helmets, despite 71% of respondents claiming that they had access to a helmet. Our findings also indicate that helmet use has declined in recent years; a similar study carried out in 2006 in Kampala found that operator helmet use was 46%, compared with 30.5% in the current study (15). Boda boda operators reported that helmet comfort and price were important barriers to correct and consistent helmet use. Uganda’s tropical climate can dissuade boda boda operators from wearing helmets, especially on warm days. Thus, there is a need for quality helmets that are both affordable and appropriate for the climate.

Similar to what we have seen in other parts of the world, boda boda operators in Kampala are aware of the protective benefit of motorcycle helmets (18,19). In the current study, among those who had

Table 2. Boda boda operator structured roadside interview results, Kampala, Uganda, March–April 2011.

	<i>Frequency (%)</i>	<i>95% CI for %</i>
How long have you been driving a boda boda for income?		
< 2 years	103 (16.6)	13.6–19.5
2–5 years	287 (46.1)	42.2–50.1
> 5 years	232 (37.3)	33.5–41.1
Do you have a helmet for your own use on your boda boda?		
Yes	435 (71.0)	67.5–74.7
Do you own a helmet?*		
Yes	409 (94.0)	91.8–96.3
How often do you wear a motorcycle helmet?*		
Always	109 (25.1)	21.0–29.1
Nearly always	111 (25.5)	21.4–29.6
Sometimes	147 (33.8)	29.4–38.2
Seldom	51 (11.7)	8.7–14.8
Never	17 (3.9)	2.3–6.2
What are the reasons for wearing a helmet when you do wear one?†§		
To be safe	339 (75.5)	71.5–79.5
Because it is required	96 (21.4)	17.6–25.2
Because others are wearing it	3 (0.7)	—
Because a friend/loved one has been injured	10 (2.2)	—
Natural element shield (rain, dust, wind, etc.)	75 (11.9)	9.4–14.5
Where do you get your safety information?‡		
Radio	319 (51.0)	47.0–54.9
Newspapers	145 (23.2)	19.9–26.5
Friends	144 (23.0)	19.7–26.3
Television	110 (17.6)	14.6–20.6
Leaders	101 (16.1)	13.3–19.0
Do you know the helmet law?		
Yes	454 (74.1)	70.6–77.5
What is the penalty/fee?††		
≤30,000 UGX	63 (16.5)	12.8–20.2
>30,000 & ≤80,000 UGX	293 (76.7)	72.5–80.9
>80,000 UGX	26 (6.8)	4.5–9.8
Have you ever been stopped by police for not wearing a helmet?		
Yes	346 (55.1)	51.2–59.0
Do you have a helmet for your passengers to use?		
Yes	128 (20.8)	17.6–24.1

*Only asked of those who responded ‘yes’ to ‘Do you have a helmet for your own use on your boda boda?’ ($n = 435$).

‡Respondent could respond ‘yes’ to more than one response option.

†30,000 Ugandan Shillings = 12 U.S. Dollars.

‡Only asked to those who responded ‘yes’ to ‘Do you know the helmet law?’ ($n = 454$).

Note: total number of people interviewed from March to April 2011 was 628.

a helmet available for use, most reported that they wore a helmet to be safe (75.5%; $n = 339$). However, with such a large portion of the population continuing to not wear a helmet, strategies beyond educating

riders on the safety benefits of helmets are needed. To date, one underutilized strategy that is known to increase helmet use is enforcement of the universal helmet law (21).

In 2004, Uganda enacted a universal motorcycle helmet law requiring motorcyclists to wear a helmet or face penalties for non-use including fines and/or imprisonment. Unfortunately, enforcement of the law has varied considerably over time. In early 2010, during the heat of an election cycle, political leaders stated publicly that riders did not have to wear a helmet if they did not want to and asked that enforcement of the mandatory helmet law cease (20). Given that riders identified leaders as an important source of road safety information, the waning support of helmet use among elected officials is problematic. Research has consistently shown that enforcement should be highly visible and sustained in order to increase compliance with road safety laws, such as helmet use laws (21). The sporadic enforcement of the helmet law may be one reason that the current prevalence of helmet use is down by more than 15% from 2006.

An important barrier to correct and consistent motorcycle helmet use by boda boda operators appears to be the lack of high-quality helmets. Low-quality helmets that do not meet standards in Uganda and other LMICs have negative effects. Low-quality helmets result in more severe injuries, (22) and, as seen in our focus group discussions, low-quality helmets affect riders' trust in helmets, leading riders to choose not to wear a helmet at all. Despite the revision of the Uganda helmet standard to a tropical helmet standard by the Uganda National Bureau of Standards in February 2012, the availability of helmets that meet the standard remains an issue. Taken together, findings from the focus group discussions and structured roadside interviews were incorporated into the multi-faceted UHVI campaign. Media campaign messages were informed by the data collected to reinforce riders' reasons for helmet use and addressed barriers to non-use. In addition to informing media campaign messages, the baseline and formative evaluation data helped determine 'the times, places, and situations' where the campaign messages would be most likely to reach the target population (23). In contrast to other parts of the world where the main channel for road safety information is the television, the preferred channel among the boda boda operators is the radio (51%; $n = 319$) (24,25).

The radio messages were liberally aired throughout Kampala. They focused on the importance of wearing a helmet during *every* boda

boda ride and addressed the identified barriers to helmet use. For example, the campaign used the following message to address *helmet comfort*:

[after actor crashes his motorcycle] ...that was close, oh goodness! My wife, my kids [sigh]. I would have cracked open my head but this helmet did the trick! They may be uncomfortable in the heat, but I am comfortably alive, apart from a few minor bruises...As you ride your bike, wear a helmet to protect yourself, because your life is your wealth.

And the campaign used the following message to address *helmet expense*:

[after actor crashes his motorcycle] ...OH! Ouch! I survived, I survived! I tried to brake and failed, but thanks to this helmet, I am alive! Buying this helmet was worth the sacrifice and money. It would have been the end for me...Life is precious and your loved ones depend on you. As you ride your bike, wear a helmet to protect yourself, because your life is your wealth.

Additional formative research identified the appropriate radio stations to reach our target audience of boda boda operators, and broadcasts were monitored to ensure message quality.

In addition to the media campaign, the baseline and formative evaluation data informed boda boda operator workshops—attended by over 900 boda boda operators. Findings from the structured roadside interviews and focus group discussions were used to shape all workshop training materials. Boda boda operators were trained on several important rider and motorcycle safety topics, including how to choose a high-quality helmet. Also, each workshop participant received a new, high-quality tropical motorcycle helmet. Additional UHVI activities informed by baseline and formative evaluation results included engagement of the community and its leaders through health events and sessions at Parliament, and policy work to help pass the new tropical motorcycle helmet standard in Uganda.

This study was subject to at least three limitations. First, the study was not representative of the country as a whole and should not be interpreted in such a way. Rather, it was designed to provide an understanding of

boda boda operators' attitudes, beliefs, and behaviors related to motorcycle helmet use in Kampala. Second, this study was conducted during times of political unrest, which may have affected our data, including helmet use wearing rates. Third, helmet use observations may have included a small percentage of motorcycle operators who were not boda boda operators. However, we would expect this percentage to be small, as most motorcycles in Uganda are used as boda bodas.

There is still much work to be done. UHVI will continue to use a multi-faceted approach that includes media, targeted education, awareness-raising activities, and policy improvements to address the issue. In addition, UHVI will continue to use data to inform program plans and will integrate program evaluation results into future plans. The radio campaign, workshops, and other UHVI activities offer promising strategies to increase helmet use among boda boda operators in Kampala. Coupled with greater attention to the enforcement of the existing law in Uganda, the authors are optimistic that helmet use will increase. As UHVI evolves, it will be important to leverage the lessons learned from other countries, such as Rwanda and Vietnam where nearly all motorcyclists wear helmets, to strengthen future programmatic activities (26,27). In addition, UHVI staff will continue to work to seek sustainable solutions to integrate UHVI program components into current policies and programs, such as integrating boda boda workshop trainings into a formalized licensure process for boda boda operators.

UHVI activities are part of a broader global effort to build capacity for preventing injuries in LMICs. Given that the two- and three-wheel burden in Uganda and neighboring countries are similar, future project developments could be shared to improve practices throughout that region of Africa. Moreover, in the context of the Decade of Action for Road Safety (decadeofaction.org), the GHVI model, applied to different country contexts, will be one of the many interventions that contribute to achieving the goals of the Decade of Action for Road Safety and assist in promoting safer and healthier roads at national levels.

Conflict of Interest and Disclaimer

None declared. The views expressed are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Funding

Funding for this work was provided by the Division of Unintentional Injury Prevention at the National Center for Injury Prevention and Control at CDC.

References

1. World Health Organization. Global status report on road safety: time for action. Geneva, Switzerland: World Health Organization; 2013.
2. Peden M, Scurfield R, Sleet D, Mohan D, Hyder AA, Jarawan E, et al. World report on road traffic injury prevention. Geneva, Switzerland: World Health Organization; 2004.
3. Kopits E, Cropper M. Traffic fatalities and economic growth. *Accid Anal & Prev.* 2005; 37(1): 169–178.
4. Tiwari G. Traffic flow and safety: Need for new models for heterogeneous traffic. In: Mohan D, Tiwari G. eds. *Injury prevention and control.* London: Taylor and Francis; 2000, 71–88.
5. Shiner D. Safety and mobility of vulnerable road users: pedestrians, bicyclists, and motorcyclists. *Accid Anal & Prev.* 2012; 44: 1–2.
6. Hyder AA, Allen KA, Pietro GD, Adiazola CA, Sobel R, Larson K, et al. Addressing the implementation gap of global road safety: explore features of an effective response and introducing a 10-country program. *Am J Public Health.* 2012; 102(6), 1061–1067.
7. Nantulya VM, Sleet DA, Reich MR, Rosenberg M, Peden M, Waxweiler R. Introduction. The global challenge of road traffic injuries: can we achieve equity in safety? *Int J Inj Contr Saf Promot.* 2003; 10(1–2): 3–7.
8. Uganda Bureau of Statistics. *Statistical Abstract.* Uganda Bureau of Statistics; 2011.
9. Uganda Bureau of Statistics. *Statistical Abstract.* Uganda Bureau of Statistics; 2010.
10. Sabbagh-Ehrlich S, Friedman L, Richter E. Working conditions and fatigue in professional truck drivers at Israeli ports. *Inj Prev.* 2005; 11:110–114.
11. Lagarde E. Road traffic injury is an escalating burden in Africa and deserves proportionate research efforts. *PLOS Med.* 2007; 4(6): 170.
12. Galukande M, Jombwe J, Fualal J, Gakwaya A. Boda-boda injuries a health problem and a burden of disease in Uganda: a tertiary hospital survey. *East and Central Africa Journal of Surgery.* 2009; 14(2): 33–37.
13. Liu BC, Ivers R, Norton R, Boufous S, Blows S, Lo SK. Helmets for preventing injury in motorcycle riders (Review). *The Cochrane Collaboration.* 2009; 1: 1–44.
14. Hurt HH, Quillet JV, Thomas DR. *Motorcycle accident cause factors and the identification of countermeasures.* Washington, DC, USA: National Highway Traffic Safety Administration; 1981 (DOT HS 805–862–3).
15. Injury Control Center – Uganda. *Helmet use in commercial motorcyclists in Kampala: prevalence,*

- associated factors, and outcomes of motorcycle-related injuries. Kampala, Uganda: Injury Control Center; 2007. (Study funded by the World Health Organization).
16. Craft G. Global helmet vaccine initiative. *Inj Prev*. 2010; 16: A185.
 17. Evans L, Frick MC. Helmet effectiveness in preventing motorcycle driver and passenger fatalities. *Accid Anal & Prev*. 1988; 20(6): 447–458.
 18. Sreedharan J, Muttappillymyalil J, Divakaran B, Haran JC. Determinants of safety helmet use among motorcyclists in Kerala, India. *J Inj Violence Res*. 2010; 2(1): 49–54.
 19. Hung DV, Stevenson MR, Ivers RQ. Barriers to, and factors associated with observed motorcycle helmet use in Vietnam. *Accid Anal & Prev*. 2008; 40(4): 1627–1633.
 20. Bareebe G. (2010, March 29). Museveni orders halt to ‘boda boda’ arrests. *The Citizen*. Retrieved from www.thecitizen.co.tz
 21. Zaal D. Traffic law enforcement: a review of the literature. Melbourne, Australia: Monash University Accident Research Centre; 1994 (Report No. 53).
 22. Peek-Asa C, McArthur DL, Kraus JF. The prevalence of non-standard helmet use and head injuries among motorcycle riders. *Accid Anal & Prev*. 1999; 31 (3): 229–233.
 23. Siegel M, Doner L. Marketing public health: strategies to promote social change. Boston: Jones and Bartlett Publishers; 2004.
 24. Cameron MH, Haworth N, Oxley J, Newstead S, Le T. Evaluation of transport accident commission road safety television advertising. Victoria, Australia: Monash University; 1993.
 25. Donovan RJ, Jalleh G, Henley N. Executing effective road safety advertising: are big production budgets necessary? *Accid Anal & Prev*. 1999; 31(3): 243–252.
 26. World Health Organization. Global Health Observatory (GHO): Distribution of road traffic deaths by type of road user. Geneva, Switzerland: World Health Organization; 2010.
 27. Boufous S, Ali M, Nguyen HT, Stevenson M, Vu TC, Nguyen DTY, et al. Child injury prevention in Vietnam: achievements and challenges. *International Int J Contr Saf Promot*. 2012; 19(2): 123–129.