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## Evaluation of an integrated multisector campaign to increase child helmet use in Vietnam

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### Abstract

**Objective**—This study presents child helmet use before, during and after implementing the Vietnamese National Child Helmet Action Plan (NCHAP) and evaluates its effect on child helmet use. The NCHAP, an integrated multisector campaign, incorporated a wide-scale public awareness campaign, school-based interventions, increased police patrolling and enforcement, and capacity building and support to relevant government departments in target provinces.

**Methods**—In Vietnam's three largest cities, 100 schools in 20 districts were selected to monitor motorcycle helmet use behaviour. The effectiveness of the NCHAP was measured by unannounced, filmed observations of student motorcycle passengers and their adult drivers as they arrived or left their schools at four points. Baseline observations at each school were conducted in March 2014, with subsequent observations in April 2015, December 2015 and May 2016.

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**Contributors** All authors reviewed the manuscript and provided revisions several times. LDTN, LP, MTHS, EMP and MRM were primarily responsible for drafting, revisions and analytic approach. LDTN and MTHS were primarily responsible for managing and analysing the data. MS and ND were primarily responsible for implementing the programme. MTHS and MS were primarily responsible for data collection. LDTN and MTHS conceptualised and helped interpret the data. All authors approved the submission for publication.

**Disclaimer** The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

**Ethics approval** Institutional review board approval was not required. The data were collected as part of routine monitoring to evaluate the impact of the multisectoral helmet use campaign. The activity did not involve the interaction with human subjects. Given that data collection involved observing children around schools, permission was received from the provincial Department of Education and Training of each city to conduct the observations.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Competing interests** AIP Foundation authors are reporting on evaluation results of the National Child Helmet Action Plan, of which it was a supporting international partner.

**Results**—Across the 84 218 observed students, student helmet prevalence increased from 36.1% in March 2014 to 69.3% immediately after the initiation in April 2015. Subsequent observations in December 2015 and May 2016 showed a reduction and stabilisation of helmet use, with 49.8% and 56.9% of students wearing helmets, respectively. Helmet use in students was higher when adult drivers were also wearing helmets.

**Conclusions**—Integrated multisectoral interventions between governments, civil society and the corporate sector that incorporate communications, school-based education, incentives for change and police enforcement have the potential to increase helmet use among children. Future integrated campaigns may be more effective with an increased focus on parents and other adult drivers given their potential influence on child helmet use.

## BACKGROUND

Globally, road traffic injuries are responsible for over 1.2 million fatalities<sup>1</sup> and 78 million non-fatal injuries per year.<sup>2</sup> By 2030, this number is projected to reach over 1.8 million fatalities.<sup>3</sup> Motorcyclists form a growing share of road traffic injuries, particularly in low-income and middle-income countries where this form of transportation is common and there is often low helmet usage.<sup>4–8</sup>

In Vietnam, over 22 000 road traffic deaths occur annually, equating to approximately 24.5 deaths per 100 000 population.<sup>1</sup> Moreover, the economic costs of injuries and death sustained on the roads are significant.<sup>8, 9</sup> Non-fatal road traffic injuries can cost a Vietnamese household, on average, 5 months of income.<sup>9</sup>

The motorcycle is the dominant form of transportation in Vietnam, with just over one motorcycle for every two persons in the country and around 15 motorcycles for every four-wheeled vehicle.<sup>10</sup> Motorcycle crashes account for 67% of road traffic deaths annually,<sup>10</sup> and 78% of these deaths result from head injuries.<sup>7</sup> Helmet use by riders and passengers reduces the frequency and severity of head injury in the event of a road crash.<sup>11</sup> Helmet non-usage has been found to be the most significant factor affecting the death rate among motorcyclists.<sup>12</sup>

Various studies have found between 90% and 99% adult driver compliance in the years since adult motorcycle helmet laws were introduced in Vietnam in 2007.<sup>1, 13–15</sup> It is estimated that the helmet policy and laws have prevented approximately 2200 deaths and 29 000 head injuries in the year following their introduction.<sup>16</sup> The impact, however, of the more recent 2010 law for child motorcycle helmets has been far less pronounced, with studies finding only 15%–53% compliance.<sup>15, 17–19</sup> Reasons given by parents for this lack of child helmet use have ranged from unfounded fear about the adverse effect of helmets on the development of a child's skull and potential neck injuries,<sup>15, 20</sup> a perceived lack of rigorous police enforcement,<sup>19</sup> helmet costs and the perceived low likelihood of having a crash.<sup>15</sup> The typical cost of a standard helmet suited to urban conditions ranges between approximately 150 000 and 300 000 Vietnamese dong (approximately US\$7–13), where the average per capita monthly income in urban areas is 4 368 000 Vietnamese dong (approximately US \$192).<sup>21</sup>

To combat low child helmet use, the National Child Helmet Action Plan (NCHAP)—a Vietnamese government initiative, under the lead of the National Traffic Safety Committee (NTSC)—was initiated in January 2015 and ran for 12 months. The NCHAP was a coordinated multisectoral campaign involving cooperation between national, provincial and district levels of government and police. The plan was supported by numerous international partners, including AIP Foundation, Global Road Safety Partnership, FIA Foundation, the WHO, the Unicef and the UPS Foundation. This paper reports on schoolbased helmet observation data in the three largest cities—Ha Noi, Ho Chi Minh City (HCMC) and Da Nang—collected before, during and after the NCHAP implementation.

## METHODS

### NCHAP overview

The NCHAP was launched nationwide on 31 December 2014 with the aim of increasing awareness of and compliance with child helmet wearing laws. The action plan had four key components: (1) a wide-scale public awareness campaign beginning 31 December 2014; (2) school-based interventions including a school campaign in September 2015; (3) enhanced patrolling and enforcement in April to May 2015; and (4) capacity building and support to relevant government departments in target provinces in January and March 2015. Throughout 2015, a wide range of communications platforms, including billboards, banners, television and social media public service announcements (PSA), flyers, audio broadcasts, and articles, were used to widely spread the message ‘Love your child, provide a helmet’.<sup>22</sup> The PSA showed that parents may make dangerous safety mistakes, and reminded parents—from the perspective of a child—that they are responsible for guiding, loving and educating children on safety. The campaign reached approximately 10 million individuals in these cities.

The national Ministry of Education and Training in the campaign called on schools to educate primary school students about helmet use and laws. Furthermore, the ministry developed and enacted child helmet school guidelines.<sup>10</sup> These guidelines were designed to involve parents as critical actors to ensure that children wore helmets whenever on motorcycles.

Crucially, the campaign used a coordinated response from national, provincial and district road transport authorities. Between 6 and 9 April 2015 traffic police held a road safety blitz around schools nationally reminding parents to ensure their children wore helmets when they were passengers on motorcycles. Motorcycle drivers whose child passengers were not wearing helmets were targeted, stopped, given a reminder and reported to schools to take further action. From 10 April 2015 to 31 May 2015, the police strictly fined violators. The reach of the campaign in terms of mass media and police enforcement response was similar across all three cities. In some locations, road infrastructure or traffic flow factors surrounding schools meant that there may have been some variations on a school-by school basis.

## NCHAP evaluation

The purpose of the evaluation was to determine whether the NCHAP activities resulted in increased helmet use among primary school children in Vietnam's three largest cities, Ha Noi, Da Nang and HCMC, both during and after campaign activities. Helmet use was estimated by filming student motorcycle passengers at a sample of schools as they arrived at and departed from school. Filmed observation has been found to be a valid and reliable methodology for measuring helmet use as it is not subject to error introduced by response bias in self-reported data.<sup>23</sup> Each sampled school was filmed on four occasions—in March 2014 before the campaign (baseline), in April 2015 immediately after enhanced police enforcement (post 1), in December 2015 which was 2 months after the September 2015 school campaign (post 2), and 5 months later in May 2016 (post 3).

The selection of sampled schools was a two-step process. First, the NTSC identified suitable districts within each city that had a national or provincial road with high-density traffic. Second, from these districts five schools were selected with a probability proportionate to their size (see table 1).

Research assistants involved in the data collection participated in training workshops held in each of the cities. Although permission was sought and received from all observed schools, observations were conducted unannounced in order to not influence the participants' behaviours. At each school, research assistants conducted filmed observations at students' arrival or dismissal time on a normal school day for each observation period. Cameras were set up at school gates in the same position for each observation for all schools. The assistants filmed motorcycles entering the schools from 30 min before commencement of classes up until 5 min after commencement, and from 5 min before dismissal through to 30 min after dismissal.

Helmet use of both the adult driver and child passenger was captured for each student on a motorcycle. All of the video footage was collected and watched by individual observers who also coded and entered the data into Microsoft Excel. SPSS v.16.0 was used to analyse the data to assess the helmet use in students during and after the national campaign. Reported helmet use was aggregated by district, city as well as a total weighted average across all observation sites. As a summary measure, weighted averages were calculated by weighting separately the populations of each school, district and city. The weight was calculated as the product of the reciprocals of the probabilities of (1) the students being selected within its school zone, (2) the school zone being selected from within its district and (3) the district being selected among the three cities. Pearson's  $\chi^2$  test was used to compare the baseline prevalence of child helmet use to each of the three subsequent occasions for each city. McNemar's test for paired samples was used to analyse the relationship between student passenger and driver helmet use at each observation point.

## RESULTS

A total of 84 218 students were observed commuting to and from schools by motorcycle over 26 months. Before the NCHAP, in March 2014, the overall percentage of student helmet use in Vietnam's three largest cities was low: only 36.1% of 31 677 student

motorcycle passengers observed wore helmets, ranging from 23.2% in Ha Noi to 48.3% in HCMC (table 2). During the campaign, at observations immediately after the enforcement component of NCHAP in April 2015 (post 1), helmet prevalence increased to 69.3% overall (ranging from 66.2 in HCMC to 75.6 in Da Nang). The increase was most pronounced in the nation's capital, Ha Noi, with an almost 50 percentage point increase in the proportion of children wearing helmets. Observed differences were significant for all cities when compared with the baseline.

The post 2 observations, which occurred 4 months before campaign activities ended, showed a marked decrease overall with a 49.8% weighted average across three cities (ranging from 36.8% in Ha Noi to 55.9% in Da Nang), but still higher than the baseline ( $P < 0.001$ ) in Ha Noi and Da Nang. The HCMC percentage went back to baseline after the initial bump. At the final observation (post 3), 5 months after the completion of the campaign, overall helmet use increased to 56.9% (ranging from 35.4% in Ha Noi to 66.7% in Da Nang). The helmet prevalence in Ha Noi and Da Nang remained significantly higher than the baseline observations. In all three post observations, the smallest of the three cities, Da Nang, maintained the highest prevalence of child passengers wearing helmets.

Helmet use in adult drivers remained relatively stable across all observations, with average prevalence ranging between 88% and 90% over the study (figure 1). This was substantially higher than helmet use among their student passengers.

To see whether there was a relationship between helmet use of the driver and helmet use of the child passenger, we compared the helmet prevalence of children on motorcycles according to whether their adult driver was wearing a helmet (table 3). We observed a significant association between student passenger helmet use and adult driver helmet use in all four observations in all three cities. Students were much more likely to wear a helmet if the adult driver was also wearing a helmet. The association between adult driver helmet use and child helmet use was significant at the baseline and all subsequent observations. Notably, both groups—student passengers with and without helmeted drivers—showed increases in helmet use as compared with baseline at the three subsequent observations.

## DISCUSSION

The NCHAP included a combination of communication, education and enforcement activities. The plan had an objective to maintain a coordinated approach involving schools, (national) Ministry and (provincial) Departments of Education and Training, Ministry and Departments of Transportation, national and international non-governmental organisations, and police. Overall this approach seemed to result in increased helmet use among children, as the three observed cities saw increase in child helmet use while the NCHAP activities were ongoing. In two cities—Da Nang and Ha Noi—these gains were somewhat reduced after the campaign activities ended, but child helmet use remained higher than baseline prevalence. This suggests a potential longer term benefit of campaign activities in those areas. Notably this longer term benefit was not observed in HCMC, where helmet prevalence following the campaign returned to precampaign levels.

School-based and community-based road safety campaigns have been found to be effective in other nearby low-income and middle-income countries, including Cambodia and Thailand.<sup>22, 24, 25</sup> Recent campaigns in Vietnam and neighbouring countries have focused on mandatory helmet policies, education, and free or subsidised helmets.<sup>19, 24, 26–28</sup> The NCHAP campaign was notably different from other recent helmet use campaigns, in that helmets were not provided to children.<sup>24</sup> Campaigns and interventions where children are given a helmet are effective in yielding rapid increases in helmet use because one of the main obstacles to helmet use, procurement, is overcome. In a national campaign, such as the NCHAP, where it is unfeasible to provide free helmets to all students, education and enforcement take on a larger role.

Education to both children and parents is important. Parents can influence child helmet use by providing helmet education, monitoring child helmet use and modelling helmet use behaviour.<sup>13, 19, 29</sup> In the NCHAP, driver helmet use was significantly associated with student helmet use over all four observations. However, driver helmet use was still much higher than student passenger helmet use. This campaign narrowed this gap, but observed helmet prevalence shows that there is still a long way to go before child helmet prevalence reaches that of adults.

The findings of this study suggest that an integrated campaign with national government leadership has the potential to bring about at least short-term changes in child helmet use. Public health campaigns related to road safety may have the best opportunity for success when they employ education, legislation and enforcement.<sup>30</sup> Presently, Vietnam has helmet laws that apply to drivers and passengers over age 6 years. These laws require that helmets meet set quality standards and be fastened when worn.<sup>1</sup> Education and enforcement efforts present an ongoing challenge in Vietnam, with education campaigns to this point insufficient and enforcement inconsistent.<sup>31</sup>

Further education campaigns may be useful in Vietnam.<sup>7</sup> Road safety education is regularly employed in schools, but not reinforced with coordinated education to adult audiences.<sup>29</sup> This may lead to children receiving inconsistent or discordant messages at school and at home, particularly if parents do not wear helmets themselves or do not insist that their child wear one as well.

Road users are more likely to follow road rules if they believe they are being enforced.<sup>6, 32</sup> Enforcement is an essential part of effective road safety communication and education campaigns.<sup>1</sup> Enforcement and fines influence helmet use.<sup>13, 28, 33–37</sup> For instance, child helmet use may be driven by fear of fines for non-compliance.<sup>19, 35</sup> In Vietnam, campaigns have typically focused on communication and education without widespread enforcement components. Enforcement as part of a campaign may be challenging because multisectoral cooperation is required. Road safety campaigns are commonly hampered by lack of coordination between key stakeholders and/or a lack of collective action.<sup>38</sup> A coordinated multistakeholder approach would assist a more sustainable change. For this reason government is the key player in these types of approaches.

There are limitations with this evaluation. First, the observations were undertaken during school journeys only. Children are often passengers on motorbikes for non-school journeys. Other areas of these cities would need to be observed in order to gain insight into child helmet use in other settings. Also, the observations were undertaken in multiple districts in Vietnam's three largest cities, highly urbanised environments, yet the majority of Vietnamese live in non-urbanised settings. Thus, these results may not be generalisable to the entire country, particularly rural areas where helmet use may differ. Finally, the evaluation was not able to isolate which components of the campaign were most effective at increasing helmet use. It was also not able to determine why effects were sustained in some locations (eg, Da Nang), but not others (eg, HCMC).

This study provides new evidence as to the potential of an integrated campaign for increasing child helmet use in low-income to middle-income countries. It highlights the importance of adults and parents as critical players in ensuring that children wear helmets. Communication and education campaigns for child helmet use are more effective when targeted to both children and their parents and combined with enforcement.

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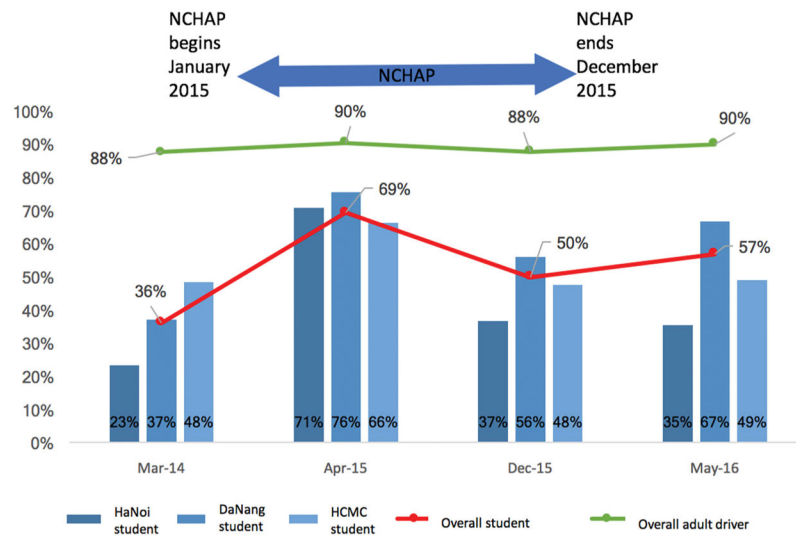
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**What is already known on the subject**

- Helmet use by riders and passengers reduces the frequency and severity of head injury in the event of a road crash.
- Helmet use by child passengers in Vietnam is low, while adult driver usage is high.

**What this study adds**

- The findings of this study suggest that an integrated campaign with national government leadership has the potential to bring about at least short-term changes in child helmet use.
- Road users are more likely to follow road rules if they believe they are being enforced.
- A coordinated multistakeholder approach would assist a more sustainable change.



**Figure 1.** Helmet use of student passengers and their adult drivers in the three cities. HCMC, Ho Chi Minh City; NCHAP, National Child Helmet Action Plan.

**Table 1**

Characteristics of districts and schools sampled for observation

No	City	Districts in the city (n)	Districts in the sample (n)	Primary schools in the city (n) <sup>39</sup>	Primary schools in the sample (n)	Students in the city (n) <sup>39</sup>	Students in the city (n) <sup>39</sup>	Students in observation schools (n)*
1	Ha Noi	28	6	717	30	618 745	618 745	42 412
2	Da Nang	8	7	99	35	84 401	84 401	26 011
3	Ho Chi Minh City	24	7	490	35	584 054	584 054	55 943
	Total	60	20	1306	100	1 287 200	1 287 200	124 366

\* Ministry of Education and Training data, 2012–2013.

Observed helmet use among children commuting on motorcycles at each observation period (weighted<sup>†</sup>, %)

**Table 2**

No	City	Baseline (March 2014)		Post 1 (April 2015)		Post 2 (December 2015)		Post 3 (May 2016)	
		Observations (n)	Helmet (%)	Observations (n)	Helmet (%)	Observations (n)	Helmet (%)	Observations (n)	Helmet (%)
1	Ha Noi	12 373	23.2	5396	70.7*	6011	36.8*	8075	35.4*
2	Da Nang	7062	37.1	2980	75.6*	3556	55.9*	4285	66.7*
3	Ho Chi Minh City	12 242	48.3	4503	66.2*	9650	47.6	8085	49.0
	Total	31 677		12 879		19 217		20 445	
	Overall weighted average <sup>‡</sup>		36.1		69.3*		49.8*		56.9*

\* P value <0.001 (each city's reported helmet use was analysed using Pearson's  $\chi^2$  test to test for significant differences between baseline and each subsequent observation point).

<sup>‡</sup> Each city's reported helmet use was calculated by weighting to the population of school, district and city.

**Table 3**

Relationship between adult driver and student passenger helmet use

		n	Student passenger helmet use weighted* (%)	P value†
Baseline (March 2014)	Driver wearing helmet	28 231	40.4	<0.001
	Driver not wearing helmet	3446	5.2	
Post 1 (April 2015)	Driver wearing helmet	11 259	74.4	<0.001
	Driver not wearing helmet	1620	21.6	
Post 2 (December 2015)	Driver wearing helmet	16 241	55.0	<0.001
	Driver not wearing helmet	2976	12.5	
Post 3 (May 2016)	Driver wearing helmet	16 853	61.3	<0.001
	Driver not wearing helmet	3592	16.8	

\* Each city's reported helmet use was calculated by weighting to the population of school, district and city.

† McNemar's test for paired samples was used to analyse the relationship between student passenger and driver helmet use at each observation point.