

Survey on Acceptance of High Visibility Clothing among Motorcyclists

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ABSTRACT – Studies had shown that wearing High Visibility Clothing (HVC) such as safety vests can improve motorcyclists' safety. However, a study by Abdul Manan indicated that only 0.33% wear HVC when riding a motorcycle during the day. Therefore, this study evaluates motorcyclists' acceptance and view of HVC. Survey questions were posted on social media and chat groups to get a response from motorcyclists. The response indicated that among the main reasons for not acquiring or owning HVC were that there are not see the benefit of HVC (37%), did not know where it is sold (24%) and HVC is not affordable (14%). While the response in terms of the main reasons for not wearing HVC is 19% wanted to depart quickly, 18% said it is hot wearing HVC and 13% responded that HVC's design is not looking nice. While 65% either agree or strongly agree that they can easily be seen by other road users when riding during the night, however, 91% and 92% either agree or strongly agree that road users can easily see motorcyclists wearing HVC and wearing HVC can improve visibility during the night and reduce crash risk respectively. This indicates that respondents agree that HVC improves visibility however most did not wear it due to several reasons highlighted in this paper. Therefore, several options may be explored in the future by considering the views of motorcyclists to design and develop HVC that can encourage the wearing rate and thus improve motorcyclists' visibility and safety.

KEYWORDS: Motorcycle safety, motorcycle clothing, motorcycle visibility, High Visibility Clothing (HVC), reflective vest, powered two-wheeler

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1. INTRODUCTION

The number of two- and three-wheeled motorcycles used increased by 10% from the year 2013 to 2016 and in 10 countries with the greatest number of these vehicles, motorcycles comprise more than 70% of vehicles (WHO, 2018). In Malaysia, motorcycles comprise 48% of total registered vehicles (Abu Kassim et al., 2020). Moreover, 60% of fatalities involve motorcyclists (Manan & Várhelyi, 2012). There are several countermeasures to reduce motorcycle crash risk and injury rate. One of the methods is by improving motorcycle conspicuities such as wearing High Visibility Clothing (HVC) or reflective vest (Solah et al., 2019).

Studies had shown that wearing a safety vest can improve motorcyclists' safety. As an example, Helman et al. (2012) conducted a literature review and concluded that it has generally been shown that high visibility and reflective clothing, headlights, or daytime running lights on motorcycles, have been effective in increasing motorcyclist conspicuity. Specifically, a study by Wells et al. (2004) found that motorcyclists wearing any reflective or fluorescent clothing had a 37% lower risk of a crash than other drivers. In contrast, motorcyclists that is less conspicuous may not be seen by other vehicle and could increase crash risk. This was shown in a study by Williams & Hoffmann (1979) that looked at 1,508 motorcycle crashes and found that inadequate motorcycle visibility is the associated factor in 64.5% of automobile or motorcycle collisions.

Although the usage of the HVC has been shown to increase the conspicuity of motorcyclists and improve safety, the actual usage was low. A study by Manan et al. (2018) which observed motorcyclists at 39 locations in peninsular Malaysia found that most motorcyclists did not wear a reflective vest and the wearing rate was only 0.3%. Meanwhile, a study by Wells et al. (2004) in Auckland, New Zealand found that 20% wear some type of reflective or fluorescent clothing.

This shows that significantly fewer Malaysian riders wear some form of HVC or reflective vests and there is a need to understand the reason behind this scenario therefore efforts can be put into improving the wearing rate (Solah et al., 2019; Alias et al., 2021). Therefore, this project will determine the motorcyclists' acceptance of the HVC and thus design and build a reflective vest prototype that fits the demands of most motorcyclists to improve the wearing rate and thus improve motorcyclists' safety.

2. METHOD

Data were collected confidentially using a web-based questionnaire via Google Forms. The questionnaire was designed to understand the feedback of motorcyclists towards the HVC or reflective vest for use when riding a motorcycle. The questionnaire was posted on social media such as Facebook and Instagram and among WhatsApp groups.

They were 506 participants in the survey which consists of motorcyclists who live in Malaysia. Questions including the state of residence, gender, age, ethnicity, occupation, household income, motorcycle capacity, type of motorcycle, the main purpose of riding a motorcycle, average travel distance with a motorcycle, the use of motorcycle for a convoy, etc. Additionally, there were questions regarding the clothing motorcycle wear when riding and questions related.

3. RESULTS AND DISCUSSION

3.1 General Information of Respondents

Table 1 below shows general information of respondents.

TABLE 1: General information of respondents

Questions	Count	Percent	Questions	Count	Percent
Age group			Occupation		
• 16-25	84	17	• Private	334	66
• 26-35	159	31	• Government	72	14
• 36-45	184	36	• Student	63	12
• 46-55	67	13	• Self employed	31	6
• 56-65	9	1.8	• Unemployed	6	1.2
• 66-75	2	0.4	Income		
Gender			• ≤ RM1,500	125	25
• Male	458	90.5	• RM1,501-3,200	174	34
• Female	48	9.5	• RM3,201-5,000	67	13
			• RM5,001-7,000	53	10
			• > RM7,000	87	17

The mean age of the respondents was 36 years excluding one respondent with 10 years of age (considered an outlier as 10 years old person is not eligible for a motorcycle license, and illegal to ride a motorcycle). While the age group mode was at 36-45 years (36%) and followed by the age group of 26-35 years (31%). The age group of 56-75 was the least (2.2%).

There were 90.5% of males while only 9.5% of females responded to this survey. Compared to the study by Manan et al. (2018), where they observed motorcyclists traveling on federal roads, female motorcyclists were only 4.4%. These indicate that fewer females are riding a motorcycle in the local context.

Most of the respondents are working in the private sector (66%). This is followed by the government staff (14%), students (12%), and self-employed (6%). Only 1% were unemployed. The mode for the income group is in the RM 1,501-3,200 range (34%). Similarly, the income class from RM 1,501-2,500 constituted 24.1% of the respondents. The next income group with RM 2,501-3,200 comprise 10% of the respondents and the income class below RM 3,200 forms 59% of the total respondents. In the highest income group, 17% of respondents have an income of more than RM 7,000.

3.2 Respondent’s Motorcycle Specification and Usage

Table 2 shows the respondent’s motorcycle specifications and usage.

TABLE 2: Motorcycle specifications and usage

Questions	Count	Percent	Questions	Count	Percent
Engine Capacity			Motorcycle Type		
• 90-110 cc	167	33	• Cafe racer	1	0.2
• 111-150 cc	216	43	• Cruiser	2	0.4
• 151-250 cc	71	14	• Motocross	10	2.0
• 251-500 cc	8	1.6	• Naked bike	36	7
• 501-1000 cc	27	5	• Scooter	67	13
• > 1000 cc	17	3	• Sport	18	3.6
Avg. travel distance a day			• Sport Touring	1	0.2
• ≤ 20km	202	40	• Touring	29	6
• 21-40 km	113	22	• Underbone (Kapcai)	342	68
• 41-60 km	80	16			
• 61-100 km	71	14			
• > 100km	40	8			

Most of the respondents have motorcycles with an engine capacity of 111-150cc (43%). The next higher capacity class was in the 90-110cc (33%). Thus, engine capacity ranging from 90-150cc was represented by 76% of the respondents. For engine capacity of 251-500, only 2% of respondents own one. This may be due to the limited motorcycle models in this engine capacity class. Meanwhile, about 3% own motorcycles with engine capacity of more than 1,000cc.

In terms of the type of motorcycle, most of the respondents own an underbone (“kapcai”) which consisted of 68% of the respondents (“kapcai” is mainly a low cc motorcycle category with an underbone design – Khalid et al., 2021). This is followed by scooters (13%), naked bikes (7%), touring (6%), and sports (4%). Less than 3% own motocross, cruiser, cafe racer, and sport touring motorcycles.

Most of the respondents (40%) travel within the range of 0-20km for routine work in a day, 22% travel for 21-40km, and 16% travel for 41-60km, which formed 78% of respondents’ distribution. Only 8% of respondents travel more than 100km per day for routine work.

3.3 HVC Acceptance by Motorcyclists

This section highlighted the result of the acceptance of HVC by motorcyclists as shown in Table 3. Results indicated that 56% owned high-visibility clothing while 44% did not. The ownership of HVC is deemed as high however the questionnaire did not further investigation regarding this matter. The possibility is some respondents considered any bright clothing as HVC and hence answered as owning one thus contributing to a high HVC ownership rate. However, the high ownership response is in contrast with the usage rate as seen from the observational study by Manan et al. (2018), which saw only 0.33% of motorcyclists wear HVC when riding during the day.

TABLE 3: Ownership of HVC

Questions	Count	Percent
Do you own HVC?		
• Yes	281	56
• No	225	44
Why didn't you buy or acquire HVC?		
• No benefit of wearing HVC when riding	83	37
• Did not know where it is sold	53	24
• Not affordable	31	14
• Already wearing jacket or other clothings	11	5
• Only ride for short distance	9	4
• Seldom or not riding during the night	7	3.1
• Seldom use motorcycle	7	3.1
• Design is less suitable	7	3.1
• Less comfort	4	1.8
• No size	3	1.3
• Wearing alternative clothing with reflector	2	0.9
• Not compulsory	2	0.9
• Takes time to wear	1	0.44
• Low quality product in market	1	0.44
• Expensive, design less suitable	1	0.44
• Embarrassed to wear	1	0.44
• No colour choice	1	0.44
• Design not looking nice, too bright	1	0.44
If you are buying HVC, how much are you willing to spend?		
• Bawah RM10.00	75	15
• RM10.01 - RM30.00	172	34
• RM30.01 - RM50.00	112	22
• RM50.01 - RM100.00	96	19
• Lebih RM100.00	51	10

The next question was “why didn't you buy or acquire HVC” which was directed to recipients who did not buy or acquire the HVC. The recipients can either choose from the three choices or give any answer (open-ended question). The result shows that most of the respondents choose the three choices given. The most responses were that there is no benefit of wearing HVC when riding (37%), followed by did not know where is sold (24%) and not affordable (14%). These responses contribute to 74% of the overall responses. Besides the given three choices about 5% respond that they already wear a jacket or other type of clothing (5%), only ride for a short distance (4%), seldom or not riding during the night (3.1%), seldom user motorcycle, design is less suitable (1.8%) and no size (1.3%). There are several responses besides the ones mentioned above and it contributed to about 4.4% of the respondents' distribution.

The next question is intended to determine how much motorcyclists are willing to spend for HVC. The highest distribution was for RM 10.01 – RM30.00 and below RM 10.00 price group which constitute 34% and 15% of respondents, respectively. About 71% of respondents were only willing to spend up to RM 50.00 for an HVC.

The next was a multiple-response question that asked for one or two main reasons respondents not wearing HVC when riding a motorcycle and was given eight choices and can give any reason (multiple response and open-ended question). There 66% of respondents gave one or two reasons, 18% gave three reasons, 8% gave four reasons, 6% gave five reasons, 1.7% gave six reasons and 0.8% gave seven reasons.

TABLE 4: Main reasons for not wearing HVC when riding a motorcycle

Questions	Count	Percent
What is 1 or 2 main reasons for not wearing HVC when riding motorcycle?		
• To depart quickly	155	19
• Hot	148	18
• Design not nice	109	13
• Not long sleeved	75	9.3
• Not in line with fashion	72	8.9
• Too fluorescent	53	6.6
• Employer information printed on HVC	49	6.1
• Unrelated information printed on HVC	33	4.1
• Did not own HVC	22	2.7
• Not beneficial	14	1.7
• Only travel short distance	14	1.7
• not beneficial during the day	8	1.0
• Not comfortable	6	0.7
• Wear	5	0.6
• Wear other clothing	5	0.6
• No comment	4	0.5
• Thin fabric and flapping when riding	4	0.5
• Forgot to wear	3	0.4
• Not compulsory	3	0.4
• feel that it is not working	2	0.25
• Left behind	2	0.25
• Loose	2	0.25
• No protection	2	0.25
• Seldom use motorcycle	2	0.25
• Wear other clothing with reflector	2	0.25
• Others	14	1.73

The result indicated that most of the respondents choose from the eight choices given which consisted of 86% of the response. The main reason for not wearing HVC was to depart quickly (19%) and similarly the next reason was feeling hot when wearing HVC (18%). The next main reason was unattractive design (13%), not long-sleeved (9%), not in line with fashion (9%), and too “fluorescent” (7%). This is in line with the study by Jenness et al. (2019) found only minorities wear high-visibility clothing. The study conducted a survey, and the results show the clothing was rejected due to appearance and did not fit their riding culture as the comfort and look of the clothing needed some improvement. The study shows that riders are saying the HVC were too “neon”, and they were riders that said they did not wear the HVC they bought because it looks “ridiculous”. Most of the riders did not like the basic HVC, however, some riders liked the cheap price and the provision of pockets. This show that riders are reluctant to wear HVC and the common reason is because of style and fitting. Furthermore, some respondents give reasons such as employer information printed on HVC (6%) and unrelated information printed on HVC (4%) for not wearing HVC.

Besides the given eight choices, the next high responses were: did not own HVC (2.7%), not beneficial (1.7%), only travel for short distances (1.7%), not beneficial during the day (1.0%), and not comfortable (0.7%). While there was a 0.6% response that they do wear HVC which is below the 1% wearing rate similar to an observational study by Manan et al. (2018), which indicated a 0.33% wearing rate. Other reasons for not wearing HVC when riding were: wearing other clothing (0.6%), no comment (0.5%), thin fabric and flapping when riding (0.5%), forgetting to wear (0.4%), and not being compulsory (0.4%).

3.4 Response to the benefit of HVC

Table 5 shows the questions with Likert responses. For the first question “do you think motorcyclists can be easily seen when riding during the night?”, most respondents (65%) either agree or strongly agree that a motorcycle can easily be seen when riding during the night. Even though most agree

motorcyclists can easily be seen during the night, more respondents (92%) either agree (17%) or strongly agree (75%) that road users can easily see motorcyclists wearing HVC. Furthermore, 91% of respondents either agree (15%) or strongly agree (76%) that wearing HVC while riding during the night will improve visibility and reduce the risk of a crash. This indicates that respondents think that wearing HVC will improve visibility. Lastly, the question probed if the installation of LED lights on clothing will improve visibility during the night and reduce the risk of crashes and about 67% responded that they either agree (20%) or strongly agree (47%) with this concept. There is not much difference then riding a motorcycle without any visibility improvement clothing. This may be due to the respondents thinking that there is sufficient lighting for their motorcycle so the LED may be redundant.

TABLE 5: Response to the benefit of HVC

Questions	Count	Percent
Do you think motorcyclists can be easily seen when riding during the night?		
• Strongly Disagree	19	4
• Disagree	37	7
• Neutral	121	24
• Agree	99	20
• Strongly Agree	230	45
Do you think motorcyclists can be easily seen when riding during the night while wearing HVC?		
• Strongly Disagree	7	1.4
• Disagree	4	0.8
• Neutral	29	6
• Agree	85	17
• Strongly Agree	381	75
Do you think wearing HVC increase motorcyclists visibility during the night and thus reduce crash risk?		
• Strongly Disagree	4	0.8
• Disagree	5	1.0
• Neutral	36	7
• Agree	74	15
• Strongly Agree	387	76
Do you think wearing HVC increase motorcyclists visibility during the night and thus reduce crash risk?		
• Strongly Disagree	33	7
• Disagree	25	5
• Neutral	108	21
• Agree	100	20
• Strongly Agree	240	47

4. CONCLUSION AND RECOMMENDATION

This study surveyed 506 respondents regarding the acceptance of HVC. The response indicated that among the main reasons for not acquiring or owning HVC were “did not see the benefit of HVC” (37%), “did not know where it is sold” (24%), and “HVC is not affordable” (14%). While the response in terms of the main reasons for not wearing HVC is 19% wanted to depart quickly, 18% said it is hot wearing HVC and 13% responded that HVC’s design is not looking nice. While 65% either agree or strongly agree that they can easily be seen by other road users when riding during the night, however, 91% and 92% either agree or strongly agree that road users can easily see motorcyclists wearing HVC and wearing HVC can improve visibility during the night and reduce crash risk respectively. This indicates that respondents agree that HVC improves visibility; however, most of them did not wear it due to several reasons highlighted in this paper. Therefore, several options may be explored in the future by considering the views of motorcyclists to design and develop HVC that can encourage the wearing rate and thus improve motorcyclists’ visibility and safety.

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