The Applicability of the Health Belief Model in Predicting Hand Washing in Zimbabwean Adult Population during COVID-19

Handrick Chigiji[1], Stanzia Moyo[2], Amos Milanzi[3], and Marvellous Mhloyi[4]

Abstract

The world has been atrophied by a new pandemic, the COVID-19, which was first discovered in December 2019 in China. The aim of the study was to assess the applicability of one of the widely used psychological health behaviour models, the Health Belief Model (HBM), in predicting hand washing as a prevention strategy for COVID-19 among the adult Zimbabwean population. The study used a questionnaire administered through online and social media platforms. The questions were reliable with a Cronbach's α = 0.72. Independent variable multicollinearity analysis was attested using Variance Inflation Factor (VIF<1) and Condition Index (Index<11). A total of 125 males and females, at least 15 years of age and residing in Zimbabwe, were reached. Fifty-percent of the respondents were males. About 60% of the respondents were aged between 18 and 35 years. Mean scores (out-of-5) for the constructs were: perceived benefits of hand washing (4.43); perceived self-efficacy (4.21); perceived severity (3.97); perceived susceptibility (3.41); and perceived barriers (1.85). Binary Logistic Models revealed that strong and significant predictors of proper hand washing were perceived self-efficacy (OR = 2.84 [95% CI: 1.24–6.52]) and perceived susceptibility (OR=1.72 [95% CI: 1.13–2.62]). The study results infer that COVID-19 intervention programmes should aim to increase perceived self-efficacy and susceptibility as these are likely to increase the odds of proper hand washing. An increase in proper hand washing is therefore likely to reduce the spread of the disease. A decrease in the disease burden is likely to reduce government expenditure on health care.

Keywords: COVID-19, hand washing, Health Belief Model, self-efficacy, susceptibility

Introduction

History is flecked with pandemics and plagues, but some of them stick out as unique due to their severity and effects on future generations. Some of the worst pandemics the world has ever experienced include the 1347 Black Death (Jarus, 2020), 1629 Great Plague of Milan, 1720 Great Plague of Marseille, 1889 Flu pandemic, 1918 Spanish Flu, 1957 Asian Flu and 1981 AIDS pandemic which is still present today. The pandemics and epidemics experienced in the 21st Century include, inter alia, the 2009 H1N1 flue (Swine Flu) (Jarus, 2020), 2014 West African Ebola and the 2015 Zika Virus (still present today). In 2020, the world faced yet another new pandemic, Coronavirus 2019 (COVID-19), which was first detected in Wuhan, China. It was first reported to the World Health Organization (WHO) on 31st December 2019 (WHO, 2020). Research by Chen (2020) reveals that the virus is related to Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and was renamed SARS-CoV-2. The virus belongs to a family of viruses that are common in animals, and may also be transmitted to

[1] Lecturer, Department of Demography, Settlement and Development, University of Zimbabwe. handrixchigs@gmail.com

[2] Senior Lecturer, Department of Demography, Settlement and Development, University of Zimbabwe.

[3] Lecturer, Department of Demography, Settlement and Development, University of Zimbabwe.

[4] Associate Professor, Department of Demography, Settlement and Development, University of Zimbabwe.

humans causing various symptoms such as pneumonia, fever, breathing difficulties, and lung infection (Chen, 2020).

By 11th March 2020, the COVID-19 outbreak had spread to 46 countries, prompting the declaration of the infections a pandemic, the first in recent history (WHO, 2020). The virus is highly infectious and can easily be spread across borders. Barely twenty days later, there were over 5.9 million confirmed cases and 360,000 deaths (WHO, 2020). By the end of May 2020, the virus hotspots were USA, Italy and Spain (WHO, 2020). The effects and spread of the disease have never been uniform across continents. Of the world infections, North America accounted for 3%, Europe 26%, Asia 25%, South America 14%, Africa 2% and Oceania 0.2% (WHO, 2020). In Zimbabwe, the first case of COVID-19 was recorded on the 20th of March 2020. From that time, the cases increased slowly during the first two months with 28 cases recorded in the first month and increased to 20 cases after 2 months (Ministry of Health and Child Care [MoHCC], 2020). Both the number of infections and deaths increased sharply from the third month. For instance, the prevalence of COVID-19 increased by 536%, from 486 infections by 20th June 2020 to 3,092 infections by 30th July 2020 (MoHCC, 2020). COVID-19 deaths also increased by 489%, from 6 deaths by 20th June 2020 to 53 deaths by 30th July 2020 (ibid).

Currently, there are no drugs efficacious enough to cure the COVID-19 virus. Hence, this prompted WHO to recommend countries to adopt a number of Non-pharmaceutical Interventions (NPIs) to reduce the transmission of the virus. Among the interventions are social distancing and regular washing of hands with soap and water, or clean them with alcohol-based hand rub (WHO, 2020). The experience and lessons from past pandemics such as Influenza have shown that countries face a number of challenges implementing social distancing measures (CDC, 2020). Hence, this leaves hand washing as one of the interventions that can be relied upon if it is implemented properly.

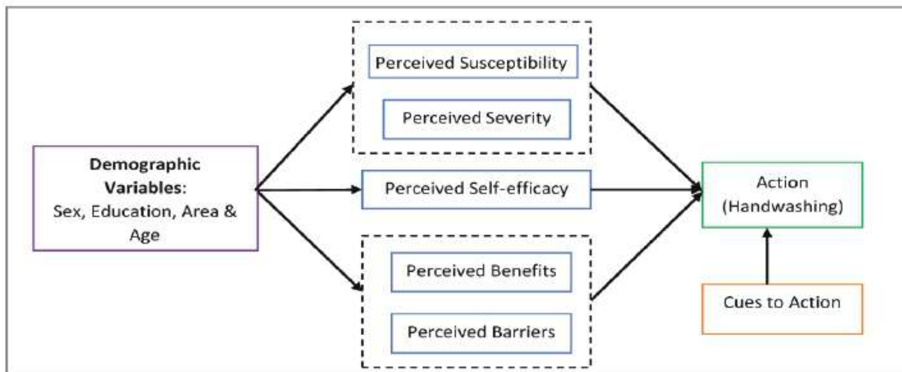
Scholars such as Nasir and Yagoub (2020) and Costa (2020) have utilized The Health Belief Model on COVID-19 research. However, it should be noted that Nasir and Yagoub's study focused on perceptions of COVID-19 among Sudanese, while Costa covered the risk determinants of the coronavirus infection in Brazil. Thus, notwithstanding the growing importance of these studies to the epidemiological discourse in general, and COVID-19 in particular, these studies focused on too broad COVID-19 prevention strategies such as risk determinants of the disease. They did not focus on hand washing, in particular, as a preventive strategy for COVID-19, and none of these studies were conducted in Zimbabwe. As such, this study is the first, in the country, to document and assess the effectiveness of hand washing as a strategy against COVID-19, and analyse the application of the HBM in predicting hand washing.

In recent decades, hand washing interventions have been developed and implemented based on psychological health behaviour models such as the Health Belief Model. HBM was originally developed by social psychologists at the US public health services in an attempt to explain why individuals failed to engage in preventive health measures (Rosenstock, 1974). Preventive health behaviour is defined as any activity undertaken by an individual for the purpose of detecting and preventing illness at a asymptomatic stage (Kasl & Cobb, 1966). HBM is also a useful model in predicting hand washing during COVID-19. Without undermining the importance of HBM in predicting preventative health behaviour, it should be

noted that there is a lacuna of scholarly literature regarding the applicability of the model to the hand washing strategy against COVID-19 especially in Zimbabwe. Existing literature on COVID-19 focuses broadly on NPIs adopted for the pandemic, and not on hand washing in particular, a gap to be filled by the current study. It should further be noted that without assessment of the model regarding hand washing, misguided interventions will be developed, hence, morbidity and mortality from COVID-19 could continue unabated.

In the current study, the HBM was used to explain the facilitating and inhibiting factors underlying the uptake of the COVID-19 hand washing strategy in the absence of evident symptoms of sickness. The basic premises of the HBM are that the uptake of the hand washing strategy is influenced by both background and intermediate variables (Figure 1). It is hypothesised that where perceived susceptibility, severity, self-efficacy and benefits to hand washing are high, an individual is most likely to practice hand washing. However, where perceived barriers to hand washing are high, people are less likely to adopt the hand washing strategy. An additional construct included in this study, the "perceived value of good health", is expected to be positively related to the desired outcome.

Figure 1: The Health Belief Model



Source: Rosenstock (1974)

Methodology

Data Collection Methods

A survey was used to collect quantitative data through a self-administered standardized questionnaire. Since the study was done between mid-April and mid-May 2020, when the country was under lockdown due to the COVID-19 pandemic, the study was undertaken on-line using the WhatsApp social platforms which are accessible to the majority of people on social media. The telephone interview platform was used for the respondents in rural areas who had no internet access or connectivity. In this study hand washing refers to "proper hand washing" which is defined as washing hands regularly with soap and water or using alcohol-based hand rub (alcohol content of 65%+) for at least 20 seconds (WHO, 2020).

Participant Selection and Sampling Procedures

In order to identify survey participants, a number of social network groups used by people of different social classes were identified. Seven people from different social classes who informed that they were on some social media platforms were identified. These were asked if they could allow the researchers to post the link of the questionnaire on the groups and five

network groups. The participants were self-selected in the sense that an open request was made on the group for anyone who wanted to fill in the questionnaire. A total of 125 respondents filled in the questionnaires and returned them.

Ethical Considerations

Respondents were informed of the objectives of the study and the instructions to complete the questionnaires. The questionnaires were designed in such a way that there was no section where a respondent could write her name. Respondents were also informed that they were free to skip any question on the questionnaire which they were not comfortable with. In addition, respondents were told that there were no direct benefit that would accrue to them, and there were no anticipated risks to encounter. Respondents were assured that the data would be used only by the researcher, and for the purposes of the study.

Measures, Data Management and Analysis

The data was exported from a google forms file to a Statistical Package for Social Sciences (SPSS) file. Data processing and statistical analysis were done using the SPSS v20. Regression analysis was done to check for the validity and applicability of HBM constructs and to predict proper hand washing.

The research assessed five out of the six HBM constructs, namely, perceived severity, perceived susceptibility, perceived benefits, perceived barriers and perceived self-efficacy. The sixth construct, cues to action, was excluded in this study. The study adopted Wu's (2020) argument that with COVID-19, one cannot wait for the typical "cue to action" for health behaviours (i.e. the experience of possible symptoms,) since cues to action are likely to come too late as a person who is experiencing the first symptoms may have already spread the virus to countless others. An additional construct, "perceived value of good health", was included in the study.

Odds ratios (ORs) were computed to measure the association between an exposure and the outcome. Reliability or consistency check was done using Cronbach's Alpha for the seven perception variables with a Likert scale category ranging from 0 to 5 (1-strongly agree and 5-strongly disagree). A Cronbach's Alpha value of 0.72 was obtained implying that the responses to the questions were reliable. This result infers that 72% of the variance in the scores was reliable.

The study used the Binary Logistic Model (BLM) to determine if the Independent Variables (IVs) were associated with respond associated with respondents washing of their hands properly (set in WHO guidelines for COVID - 19). The Dependent Variable (DV) for the model is the outcome of hand washing, which is either proper hand washing or no proper hand washing. The Outcome variable is a composite variable calculated using three conditions. The first condition is that respondant washes The first condition is that the respondent washes hands more frequently even if it is not at critical times such as before taking a meal or after visiting the toilet. The second condition is that the hands should be washed with soap and running water or hand sanitiser. The third condition is that the hands should be scrubbed for at least 20 seconds. The respondents who met the 3 conditions were considered as having "properly" washed their hands. The DV is defined as 1 is the respondent properly washes hands and 0 if otherwise.

A Multicollinearity test of HBM constructs was done to check for the robustness of the model. This was done to check for possible correlation among the IVs using Variance Inflation Factor (VIF) and Condition Index. A VIF of less than 1 for all the predictor variables was obtained suggesting that the Independent Variables were not correlated. Similarly, for the Condition Index values, the highest recorded for this measure was 11.04, confirming nonexistence of multicollinearity in the predictor variables.

Study Limitations

One of the study limitations was that the sample size was not large enough to enable cross-tabulation of the findings by important background variables such as age, sex, education and area of residence. The use of snowballing sampling in recruiting respondents usually introduces bias since initial subjects tend to nominate people that they know well. Nonetheless, the researchers attempted to minimize the sampling errors by posting the questionnaire in varied WhatsApp and social media groups.

Findings

Demographic and Socio-economic Characteristics of the Respondents

A little more than half of the respondents (54%), were males (Table 1). About two thirds of the respondents (60%), were aged between 18 and 65 years. More than 60% of the respondents had at least a Bachelor's degree. In terms of area of residence, the sample was biased towards urban respondents (81%).

Table 1: Background Characteristics of Respondents

Variables		Percentage
Sex	Male	54.4
	Female	45.6
Age Group	15-17	12.8
	18-24	30.4
	25-35	29.6
	36-45	12.0
	46-55	8.0
	56-65	6.4
	>65	0.8
Highest level of education completed	No education	0.0
	Primary	6.4
	Form 1-4	9.6
	Form 5-6	8.8
	Some college	13.6
	Bachelor's degree	40.8
	Master's degree or higher	20.8
Place of residence	Urban	80.8
	Rural	19.2
TOTAL	**N=125**	**100.0**

Source: Survey data 2020

Health Belief Model Constructs

Perceived susceptibility to contracting COVID-19 facilitates the uptake of recommended strategies that reduce the transmission of the disease. Regardless of the global and national increase in the incidences and prevalence of COVID-19, nearly half of the respondents in the current study (49%) reported that they were not at risk of contracting COVID-19 (Table 2). Note that only 11% and 6% of the respondents strongly agreed and agreed, respectively, that they could contract COVID-19. Nonetheless, a significant proportion of the respondents (31%), were not sure whether they were at risk or not.

Perceived severity is a measure of the level of perceived seriousness of negative effects of COVID-19, and it is hypothesized that it has a positive association with the uptake of the prescribed preventive measures. The study revealed that the respondents had misconceptions about COVID-19. For instance, about 8% of the respondents believed that the pandemic does not affect Black people. Note that 14% of the respondents reported a misconception that COVID-19 was like any other known diseases such as flu, which could be cured by simple medication. A sizeable proportion of the respondents, about 22%, still underestimated the pandemic's fatality given their reported perception that the chances of dying from it were very limited.

Perceived self-efficacy to hand washing refers to people who believe that they can wash their hands more frequently according to the COVID-19 guidelines. Low level of self-efficacy was likely to negatively affect the implementation of health behavioural change interventions. About 15% of the respondents did not believe that they could implement the COVID-19 hand washing guidelines. It is important to note that less than half of the respondents (47%), strongly agreed with the statement: "I can wash my hands more frequently during the day even if it's not during critical times such as before and after taking a meal or after visiting the toilet."

Perceived barriers to hand washing are perceived hurdles to health behavioural change, and it is hypothesised that they are negatively associated with the uptake of hand washing interventions. A small proportion of the respondents (6%), reported that the use of hand sanitizers did not help them and did not reduce their chances of contracting the Covid-19 virus.

Perceived benefits of hand washing positively influence the utilization of the recommended interventions aimed at reducing the spread of the pandemic. Most of the respondents (93%), believed that they benefited from washing their hands frequently. Note that 56% of the respondents strongly agreed with the statement: "I get more benefits in washing my hands throughout the day even if it's not during the critical times such as before and after a meal, after visiting the toilet."

The additional construct, " perceived value of good health," measures how a person values good health; and the higher the value, the higher the likelihood of uptake of preventive measures. The value placed on good health was almost universal. Ninety percent of the respondents perceived that they could avoid habits that were harmful to their health. The majority of the respondents strongly agreed with the 3 questions used to measure the construct: "Being healthy is important to me" (84%), "I practice good habits to stay healthy" (63%) and I avoid doing things that are harmful to my health" (58%)

Table 2: Perceptions about COVID-19, Hand Washing Practices, Barriers and Benefit and Value for Good Health

Perceptions	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
	%	%	%	%	%
Susceptibility to COVID-19					
I'm not at risk of contracting Coronavirus/ COVID-19. The chances are very slim.	11.2	5.6	31.2	35.2	16.8
Severity of COVID-19					
Coronavirus doesn't affect black people.	2.4	1.6	4.0	57.6	34.4
Coronavirus/ COVID-19 is like any other diseases such as flue which can be cured by simple medication.	7.2	1.6	5.6	60.0	25.6
Chances of dying after contracting Coronavirus/ COVID-19 are very slim.	6.4	6.4	9.6	60.0	17.6
Self-efficiency					
I can wash my hands more frequently during the day even if it's not critical times (before and after eating, after using a toilet)	46.8	37.9	5.6	8.9	0.8
Barriers to hand washing					
I do not use hand sanitizers because it doesn't help me.	4.0	0.0	2.4	64.0	29.6
Benefits of hand washing					
I get more benefits in washing my hands throughout the day even if it's not critical times (before and after eating, after using a toilet)	56.0	36.8	3.2	2.4	1.6
Value of Good Health					
Being healthy is important to me.	84.0	13.6	0.8	0.0	1.6
I practice good habits to stay healthy.	63.2	33.6	2.4	0.8	0.0
I avoid doing things that are harmful to my health.	57.6	33.6	8.0	0.8	0.0

Source: Survey data 2020 N=125

Mean Scores for Health Belief Model Constructs

Composite mean scores for the 5 HBM constructs were computed ranging from 1 (lowest) to 5 (highest). Relatively high mean scores were recorded for perceived benefits of hand washing (4.43) and perceived self-efficacy (4.21) (Table 3). The perceived severity of COVID-19 had a mean score of 3.97, while perceived susceptibility to the disease was 3.41. As expected, the perceived barriers to hand washing construct had the lowest mean score of 1.85.

Table 3: Health Belief Model Constructs Mean Scores

Constructs	N	Mean Score*	Std. Deviation
Perceived severity of Coronavirus.	125	3.97	0.72
Perceived benefits of hand washing.	125	4.43	0.81
Perceived barriers to hand washing.	125	1.85	0.81
Perceived self-efficacy.	124	4.21	0.96
Perceived susceptibility.	125	3.41	1.17
Valid N (listwise)	124		

Source: Survey data 2020

Note: * minimum = 1 and maximum = 5

Binary Logistic Models

The nested models approach was used and 3 models were generated using SPSS. The backward stepwise method was used to enter the predictor variables. In step 1 (model 1), all the 5 predictors were entered simultaneously, and the model was significant at 95% CI (p=0.002). Non-significant predictor with highest p-value, "perceived benefits of hand washing," was excluded in model 2. At step 3, the nonsignificant predictor variable "perceived severity" which had the highest p-value was excluded in the final model. The final model fitted is model 3 with 3 predictor variables: perceived benefits (p=0.056); perceived self-efficacy (p=0.014); and perceived susceptibility (p=0.011). The model has a correct prediction and classification power of 72% of the outcome.

The fitted model predicts that, after controlling for other variables (perceived benefits and susceptibility), the odds of proper hand washing will increase by 2.8 times for every unit increase in perceived self-efficacy (OR = 2.84 [95% CI: 1.24 – 6.52]). Controlling for other variables, proper hand washing is likely to increase by 1.7 times for every unit increase in the level of perceived susceptibility to COVID-19 (OR = 1.72 [95% CI: 1.13 – 2.62]). Unexpectedly, holding other variables constant, the odds ratio for proper hand washing is likely to decrease for every unit increase in perceived benefits of hand washing (OR = 0.219 [90% CI: 0.22 – 1.02]).

Table 4: Binary Logistic Regression Models

								95% CI for EXP(B)	
		B	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**	**Lower**	**Upper**
Step 1[a] (Model 1)	Perceived severity	.375	.535	.490	1	.484	1.454	.509	4.153
	Perceived benefits	-.745	.392	3.614	1	.057	.475	.220	1.023
	Perceived barriers	-.097	.466	.043	1	.836	.908	.364	2.265
	Perceived self-efficacy	1.023	.429	5.692	1	.017	2.782	1.200	6.445
	Perceived susceptibility	.342	.319	1.148	1	.284	1.407	.753	2.630
	Constant	-4.575	3.016	2.301	1	.129	.010		
Step 2[a] (Model 2)	Perceived severity	.416	.499	.693	1	.405	1.515	.569	4.033
	Perceived benefits	-.747	.394	3.596	1	.058	.474	.219	1.025
	Perceived self-efficacy	1.034	.429	5.816	1	.016	2.811	1.214	6.512
	Perceived susceptibility	.367	.295	1.556	1	.212	1.444	.811	2.572
	Constant	-5.046	2.026	6.205	1	.013	.006		
Step 3[a] (Model 3)	Perceived benefits	-.748	.392	3.640	1	.056	.473	.219	1.021
	Perceived self-efficacy	1.044	.424	6.073	1	.014	2.840	1.238	6.516
	Perceived susceptibility	.542	.214	6.407	1	.011	1.719	1.130	2.616
	Constant	-4.011	1.573	6.499	1	.011	.018		

Source: Survey data 2020

Note: a. Variable(s) entered on step 1: Perceived severity, Perceived benefits, Perceived barriers, Perceived self-efficacy, Perceived susceptibility.

Discussion and Conclusion

Discussion

This is the first study to assess the applicability of Health Belief Model in predicting proper hand washing in Zimbabwe during COVID-19. The model suggests that to increase proper hand washing, interventions should aim at increasing the level of perceived susceptibility to Coronavirus, perceived severity of the disease, perceived self-efficacy to hand washing and perceived benefits of washing hands while reducing barriers to hand washing. The study established that the HBM partially predicts proper hand washing in Zimbabwe during the COVID-19 pandemic. Out of the 5 tested model constructs, only 2 of them contributed significantly in predicting proper hand washing. These predictors are perceived susceptibility (p=0.011) and perceived self-efficacy (p=0.014). Perceived susceptibility proved to be the strongest predictor of proper hand washing.

It is worrisome to note that perceived susceptibility to Coronavirus is still low at 3.41. The result is similar to the meta-study by Brewer et al. (2007) on relationship between risk perception and health behaviour. Their study analysed thirty-four studies assessing the bivariate association between vaccination and perceived likelihood, susceptibility, or severity. In addition, nearly half of the respondents in the current study (49%) reported that they were not at risk of contracting COVID-19. Given that the global and national incidences and prevalence of COVID-19 are rapidly increasing, one would expect perceived susceptibility mean score to be high. A low mean score recorded for this construct implies that people still perceive that they are not at risk of contracting COVID-19. This result indicates that the likelihood of people engaging in proper hand washing is likely to be low. This is likely to increase the odds that people may not take health guidelines seriously, hence, hindering the efforts to contain the spread of the pandemic. The adopted hand washing strategy for coronavirus prevention is likely to fail at this level of perceived susceptibility. However, the fitted model shows that the odds of proper hand washing is likely to increase by 1.7 times for every unit increase in the level of perceived susceptibility to COVID-19 (OR = 1.72 [95% CI: 1.13 – 2.62]). To achieve the desired outcome, hand washing interventions should be targeted at increasing perceived susceptibility.

Mean score for perceived self-efficacy was fairly high at 4.21, but more can be done to increase it as it has proved to be significantly contributing to person's proper hand washing. This finding is comparable to findings by Nasir and Yagoub (2020) in Sudan, and also Costa (2020) in Brazil. The results for this construct show that 15% of the respondents do not believe that they can implement the COVID-19 hand washing guidelines. Given that the disease has been declared a global pandemic and highly infectious, one would expect a higher mean score for this construct and a minuscule proportion of people who perceive that they can properly wash hands. Level of self-efficacy is likely to negatively affect the implementation of health behavioural change. The fitted model predicts odds of 2.84 for this construct, implying that every one unit increase in the mean score of perceived self-efficacy is likely to increase proper hand washing by 2.84 times. It is recommended that the interventions should be directed towards increasing perceived self-efficacy to hand washing to reduce the spread of COVID-19.

Perceived benefits of hand washing is a construct which had the highest mean score of 4.43. The study results show that most respondents (93%) perceived that they get more benefits in washing their hands frequently. However, this predictor variable shows an unusual negative

relationship (OR = 0.219<1) with the outcome variable. This infers that an increase in the perceived benefits is likely not to increase the number of people who properly wash hands. This result is similar to the study by Costa (2020) where he concluded that the construct was not a strong predictor. It is also interesting to note that one would expect an increase in perceived benefits to significantly increase the likelihood of proper hand washing. Growing the knowledge of perceived benefits of washing hands frequently does not increase the likelihood of proper hand washing during pandemic periods.

The study further established that other two HBM constructs, perceived severity and perceived barriers, are not significant contributors to proper hand washing in Zimbabwe during COVID-19 pandemic. The finding is similar to other studies conducted for swine flu by Janz and Becker (1984) where they did a critical review of 29 HBM-related researches published during the period 1974-1984 although not specifically during a pandemic. They reported significant effects for perceived severity for 24 out of 30 studies. However, researchers such as Leventhal et al. (1999) argued that risk perceptions recorded in those significant studies proved to have a diminutive impact on health behaviour. Hence, growing the level of perceived severity to COVID-19 and perceived barriers to hand washing does not significantly increase the desired outcome. Similarly for the additional construct, "value for good health," although the results show that people value good health, it is not a significant predictor for proper hand washing.

Conclusion

This study provides, for the first time, an assessment of the application of the Health Belief Model in predicting adoption of one of the non-pharmaceutical interventions (NPIs), hand washing, in preventing the spread of COVID-19 in Zimbabwe. Significant constructs for the model in predicting proper hand washing are perceived susceptibility (strongest predictor) and perceived self-efficacy. These two constructs are likely to multiply the odds of hand washing in Zimbabwe as prescribed in the WHO guidelines for COVID-19, hence, reducing the spread of the pandemic. The study therefore recommends that intervention programmes should aim to increase the perceived self-efficacy and susceptibility as these are likely to increase the odds of proper hand washing.

References

Brewer, N.T., Chapman, G.B., Gibbons, F.X., Gerrard, M., McCaul,, K.D. & Weinlstein, N.D. (2007). Meta-analysis of the relationship between risk perception and health behaviour: The example of vaccination. *Health Psychology: Official Journal of the Division of Health Psychology*, 26(2): 136-45.

Chen, Y., Qianyun, L. & Guo, D. (2020). Emerging coronaviruses: Genome structure, replication, and pathogenesis. *J Med Virol, 92*(4), 418-23. doi: 10.1002/jmv.25681.

Costa, M. F. (2020). *Health belief model for coronavirus infection risk determinants*. Rev Saude Publica. 54:47.

European Centre for Disease Prevention and Control (CDC). (2020). *Considerations relating to social distancing measures in response to COVID-19* (Second Update). Stockholm: ECDC

Janz, N. K. & Becker, M. H. (1984). The Health Belief Model: A decade later *Health Education Quarterly, 11*(1.), 1– 47

Jarus, O. (2020). *Live science. 20 of the worst epidemics and pandemics in history*. Available on: https://www.livescience.com/worst-epidemics-and-pandemics-in-history.html. [Accessed: 27 May 2020]

Kasl, S.V. & Cobb, S. (1966). Health behaviour, illness behaviour, and sick role behaviour, Parts I and II. *Archive of Environmental Health, 12*, 246–266, 531–541.

Leventhal, H., Rabin, C., Leventhal, E. A. & Burns, E. (2001). Health risk behaviours and aging. In J. E. Birren & K. W. Schaie (Eds.). *Handbook of the psychology of aging* (pp. 186–214). Academic Press.

Ministry of Health and Child Care (MoHCC) (2020). *COVID-19 update*. Harare. Available at: http://www.mohcc.gov.zw/index.php?option=com_phocadownload&view=category&id=15&Itemid=741&limitstart=100. [Accessed: 5 August 2020].

Nasir, E. F. and Yagoub, H. M. A. (2020). Study of the Sudanese perceptions of COVID-19: Applying the Health Belief Model. *BMJ*. doi: https://doi.org/10.1101/2020.05.28.20115477.

Rosenstock, I. M. (1974). Historical origins of the health belief model. *Health Education. Monographs*. 2, 328-335.

WHO (2020). *Novel Coronavirus–China*. Available on: https://www.who.int/csr/don/12january-2020-novel-coronavirus-china/en/. [Accessed: 18 May 2020].

WHO (2020). *WHO guidelines for Coronavirus*. [Online]. Available on: https://www.who.int/health-topics/coronavirus#tab=tab_1 [Accessed: 20 May 2020].

Wu, K. (2020). *11 Reasons people adopt health behaviours' during pandemics*. Posted 21 March 2020. [Online]: Available at: Inscripta.net [Accessed: 26 May 2020].