ORIGINAL

Challenges of Adhering to Hand Washing Protocols as a COVID-19 Prevention Measure Among Slum Dwellers in Nairobi, Kenya

Desafíos de la adhesión a los protocolos de lavado de manos como medida de prevención del COVID-19 entre los habitantes de los barrios marginales de Nairobi, Kenia

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Abstract

In an effort to mitigate the outbreak of COVID-19, many countries have imposed drastic lockdown, movement control or shelter in place orders on their residents. The effectiveness of these mitigation measures is highly dependent on cooperation and compliance of all members of society. The knowledge, attitudes and practices people hold toward the disease play an integral role in determining a society's readiness to accept behavioral change measures from health authorities. Urban informal settlements are characterized by large populations occupying a small land area. Housing in informal settlements is close to each other with most households making do with poor quality and erratic water supply. How challenges of sanitation in slum dwellings in Kenya affect spread of COVID 19 is not known. Social distancing, wearing masks and hand washing among other measures are known to reduce the spread of COVID 19. Although access to hand-washing facilities with soap and water is near universal in High Income Countries, the same is not true for Low Income Countries. The purpose of this survey was to assess the challenges of hand washing as a covid-19 prevention measure among urban slum populations in Kenya. Key information of practices on hand-washing practices among this sub-population will inform the ministry of health, its collaborators and interested health sectors, on areas of improvement. A descriptive cross-sectional survey for quantitative data was be used. Solvins formula for calculation of a sample size was used. Properly designed data collection tool was used in collecting the primary data on hand washing to prevent transmission of COVID-19 with a combination of face-to-face interviews. A pre-test of the data collection tool prior to pilot data collection was performed to ascertain validity and reliability. Data was analyzed using descriptive statistics such as frequencies, mean and standard deviation and displayed using tables and figures. Inferential statistics for predictive associations between variables was performed. In the analysis, data was combined to allow reporting on an array of issues. The results indicate salient challenges on hand-washing and show an acceptable level of knowledge in mitigating COVID-19 through hand-washing and hygiene and, highlight the importance of consistent messaging from local health authorities and the government as well as the need for tailored community health education and sensitization programs to improve levels of knowledge, attitudes and practices mostly on handwashing as this pandemic may be there for some time or there could be possible upsurge in future.

Keywords: Covid-19, Hand washing, Slum dwellers, Challenges.

Resumen

En un esfuerzo por mitigar el brote de COVID-19, muchos países han impuesto a sus residentes órdenes drásticas de bloqueo, control de movimientos o confinamiento. La eficacia de estas medidas de mitigación depende en gran medida de la cooperación y el cumplimiento de todos los miembros de la sociedad. Los conocimientos, las actitudes y las prácticas que la gente tiene hacia la enfermedad desempeñan un papel integral en la determinación de la disposición de una sociedad a aceptar las medidas de cambio de comportamiento de las autoridades sanitarias. Los asentamientos urbanos informales se caracterizan por tener grandes poblaciones que ocupan una pequeña superficie de terreno. Las viviendas de los asentamientos informales están muy cerca unas de otras y la mayoría de los hogares se conforman con un suministro de agua de mala calidad y errático. No se sabe cómo afectan los problemas de saneamiento en las viviendas de los barrios marginales de Kenia a la propagación de COVID 19. Se sabe que el distanciamiento social, el uso de mascarillas y el lavado de manos, entre otras medidas, reducen la propagación del COVID 19. Aunque el acceso a las instalaciones para lavarse las manos con agua y jabón es casi universal en los países de renta alta, no ocurre lo mismo en los países de renta baja. El objetivo de esta encuesta era evaluar los retos del lavado de manos como medida de prevención del COVID 19 entre las poblaciones de los barrios marginales urbanos de Kenia. La información clave sobre las prácticas de lavado de manos entre esta subpoblación informará al ministerio de salud, a sus colaboradores y a los sectores sanitarios interesados, sobre las áreas de mejora. Se utilizó una encuesta transversal descriptiva para obtener datos cuantitativos. Se utilizó la fórmula de Solvins para calcular el tamaño de la muestra. Se utilizó una herramienta de recopilación de datos adecuadamente diseñada para recoger los datos primarios sobre el lavado de manos para prevenir la transmisión del COVID-19 con una combinación de entrevistas cara a cara. Se realizó una prueba previa de la herramienta de recopilación de datos antes de la recopilación de datos piloto para determinar la validez y la fiabilidad. Los datos se analizaron mediante estadísticas descriptivas como las frecuencias, la media y la desviación estándar, y se presentaron mediante tablas y figuras. Se realizó una estadística inferencial para la predicción de asociaciones entre variables. En el análisis se combinaron los datos para poder informar sobre una serie de cuestiones. Los resultados indican los desafíos más destacados en materia de lavado de manos y muestran un nivel aceptable de conocimientos para mitigar la COVID-19 mediante el lavado de manos y la higiene, y destacan la importancia de que las autoridades sanitarias locales y el gobierno envíen mensajes coherentes, así como la necesidad de programas de educación sanitaria y sensibilización de la comunidad adaptados para mejorar los niveles de conocimientos, actitudes y prácticas, sobre todo en materia de lavado de manos, ya que esta pandemia puede durar algún tiempo o podría recrudecerse en el futuro.

Palabras clave: Covid-19, lavado de manos, habitantes de barrios marginales, desafíos.

Introduction

The coronavirus disease 2019 (COVID-19) emerged in Wuhan, China at the end of 2019. Since then, it has spread in many countries and has been declared a global pandemic by the World Health Organization (WHO). To date, there are more than 3,343,500 people have died from coronavirus[1,2]. Lockdown measures were perceived as necessary to curb the spread of the virus as rapid human-to-human transmission occurred and much about the virus remained unknown[3]. Due to the obscurity of this novel virus, there has been a lot of confusion and misunderstanding about the virus itself, how it can spread and the necessary precautions that should be taken to prevent infection. This becomes increasingly challenging with the vast amount of misinformation and disinformation shared on social media that is clouding people's understanding of COVID-19[4].

In Kenyan context, as pertains the Corona Virus pandemic, from 3 January 2020 to 5:33pm CEST, 7 July 2021, there have been 186,453 confirmed cases of COVID-19 with 3,697 deaths, reported to WHO. As of 5 July 2021, a total of 1,417,100 vaccine doses have been administered (WHO, 2021). Generally, the WASH situation in the urban slums is below the minimum standard recommended by the World Health Organization (WHO)[5]. In Kenyan Nairobi slums, only 22 percent of households in Nairobi has water connections, while 75 percent accesses water through water vendors who overcharge, making slum dwellers pay more for their water than people living in middle- or high-income areas. The provision of sanitary services is also inadequate (UN-Habitat & Slum Upgrading Program).

In the context of waste management and practices, slums and squatter settlements areas are increasingly experiencing difficulties due to ever-increasing gap between generation, accumulation and removal. The solutions for waste management problems thus continues to compromise general standards of required hygiene. This perceived typical phenomenon in slums only does it not affect health of the dwellers but also, other arms of hygiene especially, water and sanitation.

The knowledge, attitudes and practices (KAP) toward COVID-19 play an integral role in determining a society's readiness to accept behavioral change measures from health authorities. KAP studies provide baseline information to determine the type of intervention that may be required to change misconceptions about the virus. Assessing the KAP related to hand washing in an effort to curb the spread of COVID-19 among the perceived vulnerable groups defined by the social

economic status, the slum dwellers, this would be helpful to provide better insight to address poor knowledge about the disease and the development of further or harnessing the current preventive strategies and health promotion programs. Among the lessons learned from the SARS outbreak is that knowledge and attitudes are associated with levels of panic and emotion which could further complicate measures to contain the spread of the disease[6]. The survey also gives a general picture of informal settlement population's COVID-19 prevention practices and this can better prepare the government to address future health crises involving infectious diseases using similar approach for COVID-19 prevention. The results of this pilot study are important to inform future efforts focusing on a broad scope approach with an aim of societal readiness to comply with pandemic control measures.

Survey Methodology

The data tool and collection
A new data entry form was developed and validated after the first was found to have some missing variables to inform the survey objectives. A mixed method of both qualitative and quantitative approach was utilized to achieve the preliminary objectives of this pilot study. A survey was most appropriate as it allowed large populations to be assessed with relative ease[7]. In this study, a cross-sectional survey was deemed most appropriate to gather information on COVID-19 for the informal settlement context. Data collection was performed face to face for this pilot study using a KAP model to collect data among slum dwellers in selected slums in Nairobi namely; *Kibra* and *Mukuru kwa Njenga*.

Ethically, as it should be in a research quest dealing with human subjects, utmost consent to interview the participants was sought and, considering the fact that it was still in COVID-19 era, measures are put in place to ensure that there was no risk of compromising the participants' health more so, contracting the virus. Masks were provided to all research assistants and the chief investigators as well as hand sanitizers. It was also paramount that, time spent with a specific participant was as minimal as possible.

The pilot sample size and the Sampling Procedure
A cluster stratified sampling technique was used to determine the sample size convenient for the pilot study in the context of the of the chosen study sites' population size as below, and with a 50% of the proportionate allocated population as shown below. Simple random sampling was then used to select individual participants

i. Sample size in Mukurukwa Njenga slum which has 300,000 slum dwellers: Proportionate Allocation= Number of elements selected = 300,000/ 1,250,000*400 = **96**

ii. Sample size in Kibera slum which has 250,000 slum dwellers: Proportionate Allocation= Number of elements selected = 250,000/ 1,250,000*400 = **80**

Therefore, we used 162 participants for this pilot study after some 14 questionnaires were found to be improperly filled during data collection. The forms / data collection tools were distributed to selected participants for filling via self-administered questionnaire approach with close supervision by research team members to ensure valid information was completed. Where applicable, face to face interviews were also conducted Primary data on hand washing was collected using a knowledge, attitude, and practices questionnaire tool on their influence on hand washing. This tool was convenient, timely and financially.

The thematic areas of pilot data collection
With a view of achieving the objectives of this study, data from primary sources was used. The primary data consisted of knowledge, attitude and practices on hand washing, water station services and utilization of the existing hand-washing equipment for COVID 19 prevention. Major issues to be examined on the set hand washing stations improvised by several organizations including KMTC included; accessibility, reliability, quality and quantity and sustainability of the water and sanitation services.

The data collection tool
The questionnaire consisted of four main themes: 1) demographics, which surveyed participants' socio-demographic information, including gender, age, slum of residence, religion, marital status, occupation, and household size; 2) challenges of hand washing as a COVID-19 prevention measure 3) knowledge about COVID-19; 3) knowledge, attitude and practice of hand washing as a COVID-19 prevention measure. The survey was offered in the English and translation to Kiswahili by the data collection team. This approach was used to ensure linguistic and conceptual equivalence.

The Pilot Data entry and Analysis
Data entry into the SPSS started on 5th April 2021 for one week and this was followed by data analysis and report generation for the pilot survey.

Throughout the period of the pilot testing, the approach very little amendments mostly on the timing of data collection and the best way to harmoniously retrieve information from the study population. The information gathered was optimum utilized to address the pertinent objective of the pilot study as well as the preliminary results to inform the broad scope approach for the main study was successfully backed up.

Data was analyzed using descriptive statistics such as frequencies, mean and standard deviation and displayed using tables and figures. Inferential statistics for predictive associations between variables was conducted. In the

analysis, data from survey was combined to allow reporting on the objectives of the study. Because questionnaires are typically short, analysis was completed quickly after data gathering, and the report was prepared prior to dissemination to KMTC and UN-Habitat.

Results

Pre-testing data collection tool

Pre-testing measured the reaction of the selected group of individuals and helped in establishing whether the priority audience would easily provide information using the then current components of the data collection tool - usually whether the draft materials understandable, believable and appealing. On the same approach, we ascertained the feasibility of using the same tool in it's the then format. We were able to eliminate some few components which were overlapping especially in collecting a string type qualitative data as would be in SPSS analysis. This was done at section 2 and 3 of data collection.

The Pilot study basic report
Demographic Characteristics

A total of 162 participants participated in the study. Out of the total, the most of participants were between the ages of 25 - 34 years 65 (40.1%), with only 5 (3.1%) being over the age of 45 years. The gender of the participants was closely the same at Male, 80 (49.4%) and Female 82 (50.6%), while most were Christians 123 (75.9%) the household size with majority was at 1-5, 93 (57.4%) as per the number of family members (**Table I**).

Assessment of Challenges of hand washing as a COVID-19 prevention measure with selected demographic characteristics using a contingency coefficient

With six questions requiring a yes or a no answer, together with five statements on a Likert scale of 1 to 5 ascertaining the possible challenges with respect to specific demographic and related population characteristic, the pilot study established that, the symmetric measures contingency coefficients generated were far from zero indicating a level of dependence. The frequency table below (**Table II**) demonstrate the cumulative responses to explain the proportions of specific challenges among the participants. On this note, over 50% of respondents indicated that challenges where a norm in the slums with greater percentage reporting 'no' on; lack of access to alcohol-based hand rub, 112 (69.6%), lack of sufficient wash-stations 10 (64.0%) and, lack of adequate water and soap supply 116 (71.6%) and 110 (67.9%) respectively.

The Likert scale of 1-5 defining; 1=very low extent, 2=Low extent, 3=moderate extent, 4=high extent and 5=very high extent demonstrated that, challenges' extent was above 60%, as depicted in **table III** below with each sited challenge demonstrating a mean score of above 3, equivalent to 60%, this being similar to the responses given in terms of 'yes' or 'no' above.

Knowledge, attitude and practices of hand washing as a COVID-19 Prevention measure

Knowledge on Handwashing as a COVID-19 Control Measure

Four broad questions were used to measure knowledge on the hand washing as a COVID-19 control measure. Most participants acknowledged having known of the COVI-19 control measures from government directed TV adverts and the normal TV programs 54(33.3%) and 61(37.7%) respectively with other sources of information

Table I: Key participants' demographic characteristics.

		Frequency	Percent	Valid Percent	Cumulative Percent
Education level					
Valid	Primary level	26	16.0	16.0	16.0
	Secondary level	78	48.1	48.1	64.2
	Tertiary level	58	35.8	35.8	100.0
	Total	162	100.0	100.0	
Sex of the participant					
Valid	Male	80	49.4	49.4	49.4
	Female	82	50.6	50.6	100.0
	Total	162	100.0	100.0	
Size of household					
Valid	1-5	93	57.4	57.4	57.4
	6- 10	62	38.3	38.3	95.7
	11 and above	7	4.3	4.3	100.0
	Total	162	100.0	100.0	
Age of participant					
Valid	18 – 24 years	57	35.2	35.2	35.2
	25 – 34 years	65	40.1	40.1	75.3
	35 – 44 years	35	21.6	21.6	96.9
	45 + years	5	3.1	3.1	100.0
	Total	162	100.0	100.0	

recording lower percentages (**Table IV**). The average knowledge score for participants was above average between 1.0556 and 4.1728 on several knowledge scores (**Table V**), with majority being aware that, poor hand washing practices can further enhance the spread of corona virus in your community 154 (95.1%) (**Table**

VI). The overall correct answer rate of the knowledge questions was above 60% while the range of correct answer rates for all participants were between 50 to 100%. Most participants know that hand washing prevents corona spread 134 (82.7%) (**Table VII**) representing an acceptable level of knowledge on COVID-19.

Table II: Challenges associated with hand-washing and hygiene in COVI-19 Prevention.

		Frequency	Percent	Valid Percent	Cumulative Percent
Have you received any training in hand hygiene during this COVID period?					
Valid	yes	83	51.2	51.2	51.2
	no	78	48.1	48.1	99.4
	3.00	1	.6	.6	100.0
	Total	162	100.0	100.0	
Do you easily access alcohol-based hand rub for hand hygiene?					
Valid	yes	49	30.2	30.4	30.4
	no	112	69.1	69.6	100.0
	Total	161	99.4	100.0	
Is there sufficient hand washing points where you live?					
Valid	yes	57	35.2	35.4	35.4
	no	103	63.6	**64.0**	99.4
	3.00	1	.6	.6	100.0
	Total	161	99.4	100.0	
Missing	System	1	.6		
Total		162	100.0		
The hand washing points and are accessible within à 100 Meters					
Valid	yes	82	50.6	50.6	50.6
	no	80	49.4	49.4	100.0
	Total	162	100.0	100.0	
Hand Washing stations have adequate water supply					
Valid	yes	46	28.4	28.4	28.4
	no	116	71.6	**71.6**	100.0
	Total	162	100.0	100.0	
Hand washing points have adequate supply of soap					
Valid	yes	51	31.5	31.5	31.5
	no	110	67.9	67.9	99.4
	3.00	1	.6	.6	100.0
	Total	162	100.0	100.0	

Table III: Extent of challenges measured on the mean of a Likert scale of 1 to 5.

		Statistics					
		Distance to hand washing station from the house affects my frequency of hand washing	Consistency of Water supply	Crowding at hand washing station	Lack of soap at hand washing station	High cost of water and soap	Poor accessibility to the water points/ stations
N	Valid	162	161	162	161	159	161
	Missing	0	1	0	1	3	1
Mean		**3.1481**	**2.9255**	**3.4074**	**3.3292**	**3.5723**	**3.4783**
Sum		510.00	471.00	552.00	536.00	568.00	560.00

Table IV: Source of information on COVID-19 Control protocol.

		Statistics				
		What do you think can happen/happens due to improper hand washing in terms of health?	Do you think poor hand washing practices can further enhance the spread of corona virus in your community?	What do you think can happen in future as regards corona spread with improper hand washing?	I basically know about principles of hand washing to prevent corona spread	I know that hand washing prevents corona spread
N	Valid	160	162	160	162	162
	Missing	2	0	2	0	0
Mean		**1.6125**	**1.0556**	**1.9938**	**3.9321**	**4.1728**
Std. Error of Mean		.06515	.02006	.10877	.08718	.08006
Std. Deviation		.82407	.25538	1.37588	1.10968	1.01895

Attitude on Handwashing and hygiene as a covid-19 Control Measure

Participants were asked a question guided by three attitude rating in assessment of attitudes. The question asked whether or not it concerns them how hand washing is practiced to prevent corona spread in your community and the rating of attitude was on; To what extent they were satisfied about hand washing behavior, how interested would they try to mitigate poor hand washing behavior and how important they regard hand washing.

For the first question, a majority of participants 138 (85.2%) were concerned with how hand washing was being practiced. Even so, 66 % of participants were unsatisfied with the handwashing practices, while 81.5 agreed that they would mitigate poor handwashing practices and 74.8% regarded hand-washing as important (**Table VII**).

Table V: Knowledge assessment by use of Likert scale mean and Proportions on a 'yes' or no and by Likert scale on knowledge score.

		Frequency	Percent	Valid Percent	Cumulative Percent
Do you think poor hand washing practices can further enhance the spread of corona virus in your community?					
Valid	yes	154	95.1	95.1	95.1
	no	7	4.3	4.3	99.4
	3.00	1	.6	.6	100.0
	Total	162	100.0	100.0	
I know that hand washing prevents corona spread					
Valid	Strongly Disagree	8	4.9	4.9	4.9
	Disagree	2	1.2	1.2	6.2
	Neutral	18	11.1	11.1	17.3
	Agree	60	37.0	37.0	54.3
	Strongly Agree	74	45.7	45.7	100.0
	Total	162	100.0	100.0	

Table VI: .

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Government TV Ads	54	33.3	33.3	33.3
	Government sms	16	9.9	9.9	43.2
	TV programs	61	37.7	37.7	80.9
	Friends	8	4.9	4.9	85.8
	Acquaintances/Neighbors	5	3.1	3.1	88.9
	Other family members	5	3.1	3.1	92.0
	Social media (twitter, text, Facebook etc.)	5	3.1	3.1	95.1
	Internet	1	.6	.6	95.7
	Work colleagues	2	1.2	1.2	96.9
	Church/ Worship Centre	5	3.1	3.1	100.0
	Total	162	100.0	100.0	

Table VII: Attitude on Handwashing and hygiene as a covid-19 Control Measure.

		Frequency	Percent	Valid Percent	Cumulative Percent
To what extent are you satisfied about hand washing behavior in your community?					
Valid	Very dissatisfied	29	17.9	17.9	17.9
	Dissatisfied	78	48.1	48.1	66.0
	Satisfied	37	22.8	22.8	88.9
	Very satisfied	17	10.5	10.5	99.4
	5.00	1	.6	.6	100.0
	Total	162	100.0	100.0	
Does it concern you how hand washing is practiced to prevent corona spread in your community?					
Valid	yes	138	85.2	85.2	85.2
	no	22	13.6	13.6	98.8
	5.00	2	1.2	1.2	100.0
	Total	162	100.0	100.0	
How interested would you try to mitigate poor hand washing behavior in your community?					
Valid	Very un-interested	12	7.4	7.4	7.4
	Un-interested	18	11.1	11.1	18.5
	Interested	92	56.8	56.8	75.3
	Very interested	40	24.7	24.7	100.0
	Total	162	100.0	100.0	
How important do you regard hand washing?					
Valid	Not important	8	4.9	4.9	4.9
	Partially Important	20	12.3	12.3	17.3
	Important	127	78.4	78.4	95.7
	Not important	7	4.3	4.3	100.0
Do you follow the guidelines indicating that you should wash your hand regularly					
Valid	yes	141	87.0	87.0	87.0
	no	21	13.0	13.0	100.0
	Total	162	100.0	100.0	

Assessment of Practices of Hand-washing as a covid-19 Control Measure

Practices toward COVID-19 were measured using three questions enquiring on: 1) following the guidelines indicating that they should wash their hand regularly 141 (87.0%), 2) reminding other people to properly wash their hands when not doing it properly or not at all 127 (78.4%) and 3) whether there are better practices that could be adopted in ensuring hand hygiene in community by the government based on the nature settlement, the slum. 121(74.7%) (**Table VIII**).

Table VIII: Assessment of Practices of Hand-washing as a covid-19 Control Measure.

		Frequency	Percent	Valid Percent	Cumulative Percent
Do you remind other people to properly wash their hands when you see them not doing it properly or not at all?					
Valid	yes	127	78.4	78.4	78.4
	no	35	21.6	21.6	100.0
	Total	162	100.0	100.0	
Do you think that there are better practices that could be adopted in ensuring hand sanitation in your community by the government based on the nature of your settlement, the slum?					
Valid	yes	121	74.7	74.7	74.7
	no	41	25.3	25.3	100.0
	Total	162	100.0	100.0	

Table IX: Knowledge as measured by Education level (ANOVA).

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
Do you think poor hand washing practices can further enhance the spread of corona virus in your community?	Between Groups	.014	2	.007	.107	.898
	Within Groups	10.486	159	.066		
	Total	10.500	161			
I basically know about principles of hand washing to prevent corona spread	Between Groups	**7.544**	**2**	**3.772**	**3.145**	**.046**
	Within Groups	190.709	159	1.199		
	Total	198.253	161			
I know that hand washing prevents corona spread	Between Groups	2.705	2	1.353	1.308	.273
	Within Groups	164.455	159	1.034		
	Total	167.160	161			

Table X: Correlation between Education level and the proper hand-washing practices among the participants.

Correlations					
		Education level	Do you think that there are better practices that could be adopted in ensuring hand sanitation in your community by the government based on the nature of your settlement, the slum?	Do you remind other people to properly wash their hands when you see them not doing it properly or not at all??	Do you follow the guidelines indicating that you should wash your hand regularly
Education level	Pearson Correlation	1	-.105	-.041	-.110
	Sig. (2-tailed)		.186	.600	.163
	N	162	162	162	162
Do you think that there are better practices that could be adopted in ensuring hand sanitation in your community by the government based on the nature of your settlement, the slum?	Pearson Correlation	-.105	1	.108	.325**
	Sig. (2-tailed)	.186		.170	.000
	N	162	162	162	162
Do you remind other people to properly wash their hands when you see them not doing it properly or not at all?	Pearson Correlation	-.041	.108	1	.557**
	Sig. (2-tailed)	.600	.170		.000
	N	162	162	162	162
Do you follow the guidelines indicating that you should wash your hand regularly	Pearson Correlation	-.110	.325**	.557**	1
	Sig. (2-tailed)	.163	.000	.000	
	N	162	162	162	162

**. Correlation is significant at the 0.01 level (2-tailed).

Specific demographic characteristics and selected key Knowledge, Attitude and Practice measures

Knowledge as measured by Education level (ANOVA)

The analysis of variance on specific demographic characteristics and a key selected knowledge measures demonstrated that, basically most of the participants with secondary education and above knew about principles of hand washing to prevent corona spread (significance level of .046) (**Table IX**).

The association between Education level and the proper hand-washing practices among the participants

The analysis revealed that, education level positively predicted the hand-washing practices among the residents of the slums for this pilot study indicating that the government can benchmark better practices guideline, that they remind others of proper practices and that they follow the stipulated guidelines as directed by the government with significance levels of $p < 0.05$ (**Table X**).

Discussion

COVID-19 is a relatively new virus that has had devastating effects within the short time since it was first detected in December 2019. To date, there has been limited published data on population knowledge, attitudes and practices toward COVID-19, specifically in informal urban settlements. The novelty of this disease, along with its uncertainties, make it critical for health authorities to plan appropriate strategies to prepare and manage the public health in a blanket approach and by focus on most vulnerable sub-populations in the community. It is therefore of utmost importance that the challenges and knowledge, attitudes and practices of the informal settlement population be studied to guide these efforts.

The key challenges associated with adhering to handwashing protocols mapped out from this study indicated that, over 50% of the population experienced challenges especially, lack of access to alcohol-based hand rub, lack of sufficient wash-stations and, lack of adequate water and soap supply. Most of these challenges as depicted from Likert scale showed that they were associated with poor demographic characteristics ranging from education to nature of settlements as indicated by other studies[8], similar to an Indian survey[9].

Most participants acknowledged having known of the COVI-19 control measures from government directed TV adverts and the normal TV programs with other sources of information recording lower percentages, these populations can only get such information in substantial manner as hand technology (advanced cellphones for instance) are consider luxury to them and can't afford as sited by past studies[10]. The average knowledge score for participants as measured across the Likert scale on the indicators of the same was above average between 1.0556 and 4.1728 on several knowledge scores. This was seemingly the same in findings from a study which established the fact that, despite the challenges, the general knowledge of hand-hygiene was universal as this is taught even at basic education level[11], with majority being aware that, poor hand washing practices can further enhance the spread of corona virus in your community (95.1%), this result replicating similar findings[12]. The overall rate of the knowledge questions was above 60% while the range of correct answer rates for all participants were between 50 to 100% with majority knowing that hand washing prevents corona spread (82.7%)[13]. Also, several studies conducted among Syrians have indicated high levels of COVID-19 knowledge among the general population[14].

The present study found that a large majority of participants held positive attitudes toward overcoming COVID-19 through hand-washing as the most feasible way, citing other measures as a little bit expensive and difficult to comply with. The attitude of the participants demonstrated that, majority of participants (85.2%) were concerned with how hand washing was being practiced. Even so, 66 % of participants were unsatisfied with the handwashing practices, a greater percentage at 81.5% agreed that they would mitigate poor handwashing practices and 74.8% regarding the practice of hand washing in preventing covi-19 spread as important. These current collective results are similar to others[15]. Generally, high levels of positive attitudes were also detected in the KAP study conducted in China[16], which replicates this current pilot study.

Practices of hand washing and hygiene towards COVID-19 prevention showed that a greater percentage over 80% were following the guidelines indicating that they should wash their hand regularly and would remind other people to properly wash their hands[17,18]. They also felt that, based on their presumed "isolated lifestyle", better practices could be adopted in ensuring hand hygiene in community by the government as perceived before in other studies[19].

From the general perspective view of the entire KAP analysis, we attributed the positive attitudes and seemingly good practices on hand-washing to the drastic measures taken by the Kenyan government in mitigating the spread of the virus, but bearing in mind that challenges are bound to compromise these efforts in the context of informal urban settlements.

Specific demographic characteristics and a key selected knowledge measures with ANOVA test demonstrated that, basically participants with secondary education and

above knew about principles of hand washing to prevent corona spread with a significance association as well as practices on handwashing demonstrating depicting a positive correlation at a significant p-value with Pearson correlation test for association. This is commensurate with past studies implicating that education positive predicts the proper handwashing knowledge and practices[20].

COVID-19 has been a teething public health problem around the world. Vaccination programs for the same has been benchmarked across several countries in the world. Social scientists, especially those in public health and health communication, are working to identify the levels of knowledge, attitudes and practices on COVID-19 among the public in different settings as to design cost-effective public health campaigns and education programs. The current survey, in fact, exposes the need for more comprehensive sensitization, support and improving the infrastructure needed in offering services to mitigate the COVID-19 and focus on consistency of information from the government and related authorities on handwashing as a measure to control COVID-19. Due to the levels of media use with TV messages by the government and messages from TV and evidence from prior research[21], authorities would benefit from utilizing both such to reach the presumed marginal areas, the informal settlements in disseminating these messages.

Conclusions

In summary, the present study was able to provide a comprehensive examination of the challenges and knowledge, attitudes and practices among informal settlements population towards hand washing and hygiene as a protocol to mitigate the spread of COVID-19. The findings suggest that they possess an acceptable level of knowledge on COVID-19 and are generally positive in their outlook on overcoming the pandemic. Even so, consistent messaging from the government and/ or health authorities are key to aid public knowledge and understanding of COVID-19 and the feasibility of hand washing, especially in their settings. Specific health education programs to raise COVID-19 knowledge and improve practices is of paramount importance as the pandemic may be here to stay for some time and that, such populations are more vulnerable due to related demographics.

Conflict of Interest
The authors declare that no competing interests exist.

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