

COMPLIANCE AND IMPACT OF MOZAMBICAN STATE OF EMERGENCY ON COVID-19 CONTAINMENT MEASURES: A CROSS-SECTIONAL STUDY IN AN URBAN SETTING

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ABSTRACT

The study aimed to describe responses to changes in behaviour associated with the Coronavirus containment measures, to assess the impact on behaviour related to physical activity and family incomes and to determine the association between compliance with the containment measures and social demographic variables. A cross-sectional study design was applied. Adults (n=1054) from two main cities of Mozambique were interviewed. Virtually everyone goes out frequently (99.4%), mostly to work, selling and shopping. Masks were always used (75.9%) and 91.7% declared to have increased washing hands frequently. Among those who exercise, 54.7% exercised outdoors in groups. More than half (54.9%) declared that their income was affected and physical activity was reduced for 30.1% of the subjects. From the logistic regression analysis, Males (OR=1.42), vendors (OR=2.09) and students (OR=1.97) tend to stay at home less. Predictors for not staying at home were informal business (OR=11.54), working (OR=8.83), hanging out (OR=4.76), shopping (OR=2.75) and physical activities (OR=2.73). Informal vending is the occupation more likely to lose income (OR=9.05). The strategy for preventing the spread of the coronavirus proposed worldwide found severe constraints in its application in the urban context of Mozambique.

Keywords: COVID-19; Impact; Lifestyle; Compliance; Contingency measures; Urban; Mozambique/Africa.

INTRODUCTION

As the novel Coronavirus (Covid-19) pandemic has spread around the world, countries have adopted several mitigating measures (Velavan & Meyer, 2020). In Mozambique, an effort was made to fight against this pandemic by the government declaring a state of emergency on 1 April 2020. This entailed the closing of its international borders, prevention of all public activities, affecting gatherings of people, such as at schools, religious events, sports or cultural events (CMM, 2020). The government also advised its citizens to practise physical distancing, avoiding group activities, frequent hand washing, spending less time indoors and using of

masks/face coverings in public spaces, including shopping malls, markets and on public transport. Stay at home messages were televised and broadcast on public radio.

Massive behaviour change were required to prevent the spread of Covid-19. Several behaviour change theories have been proposed for explaining various aspects of human behaviour and behaviour change (Kwasnicka *et al.*, 2016). In the context of the COVID-19 pandemic, and independent of any controversy about the efficacy of these measures, effective implementation required immediate behaviour changes that could be impacted by several factors including demographic, economic, social and cultural characteristic (Kapata *et al.*, 2020; Mboera *et al.*, 2020). Monitoring the degree of compliance seems to be important to correct possible specific constraints, consequences and may be more effective if taking into account existing changing behaviour theories.

Another important aspect is to evaluate the impact of these measures as they relate to many aspects of social life. Amongst the negative impact, caused by the emergency rules, are those related to non-communicable diseases (NCD), namely a significant reduction in habitual physical activity and the loss of income. The reduction on physical exercise with the consequences of a possible increase in obesity will have an impact on diabetes and hypertension.

On the other hand, normal health activities were restricted with a poor control of chronic patients, like the ones with NCDs. The effect of limiting exercise routines, caused by required closure of gyms and sports clubs and the restrictive requirements known as “stay at home”, may have negatively impacted on healthy behaviours and the consequent public health implications (Chen *et al.*, 2020). The prevalence of NCDs in Mozambique have increased significantly in the last 15 years, mainly hypertension and diabetes prevalence, while obesity is already an important problem particularly among urban women (Silva-Matos *et al.*, 2011; Fontes *et al.*, 2019; Macicame *et al.*, 2021).

The shutdown of different economic activities may significantly impact family incomes particularly those generated from the informal economy, which is an important source of income in urban centres of Mozambique.

It seems reasonable to assume that a complex mix of socioeconomic and cultural factors, such as individual incomes, cultural perceptions and survival needs, could impair a positive attitude towards the containment measures implemented by public health and government institutions in guiding the society during this pandemic. Although anecdotal data and some reports (CISM, 2020; INS, 2020) suggest large non-compliance by the population related to the preventive behaviours. To date, no study has published information about the potential relationship between public response to mitigating measures and their impact on socio-demographics in the Mozambican urban environment.

PURPOSE OF STUDY

Within the limits of the variables that can be observed, this study was conducted in two Mozambican cities, Maputo and Matola, to (1) describe the responses to changes in behaviour associated with the Coronavirus containment measures, (2) assess the impact of containment measures on behaviour related to physical activity and family incomes and (3) determine the association between compliance with the containment measures and social demographic variables.

METHODOLOGY

Study setting and design

The study was carried out in 13 districts of Maputo and Matola. Maputo is the capital of Mozambique and Matola is an adjacent city. Although political and administratively separated, the two cities share the same type of physical, social and economic metropolitan life. The total population of the two cities is 2,112,474 inhabitants (INE, 2017). Being part of a classified low-income country, with a Human Development Index (HDI) of 0.437 (UNHDP, 2018), the geographic area of the study represents 20.2% of the total Gross National Production (GNP) of the country.

Sanitary infrastructure, water supply, transport and housing are very deficient in several areas. The main economic activities are government, financial and administrative head offices, ports, tourism and fishing. Although in 2015, the poverty rate (proportion of people whose monthly price-adjusted total household consumption per capita is below the poverty line in the corresponding year and region) for the country was estimated to be 48.4%. The rate for the study area was estimated to be 12% and 4% for Maputo and Matola cities respectively (WB, 2015).

Sample

Considering that the aim of the study was to describe the factors/predictors of non-compliance with the containment measures, the specific target population were citizens older than eighteen (18) years of age who were out of home and distributed across 13 districts of Maputo city and Matola.

The sample size was 1 054 individuals, based on the following assumptions: (a) 95% confidence and (b) sampling error around 3%. The sample was stratified neighborhoods and proportional to the size of the districts using the 2017 National Population Census results.

Access/recruitment points were the main public transport terminals for each district. Every 10 minutes a person arriving at the bus terminal was randomly selected and asked to be interviewed. To reduce the sampling bias, the interviews were distributed across the day, from 6am to 6pm and across the weekdays, Monday to Sunday, for two weeks. People driving their own cars are not represented in the sample. However, it is important to stress that more than 80% of the people in those selected areas use public transport.

Questionnaire

A cross-sectional survey was carried out during the second and third weeks of May 2020. After obtaining verbal consent, trained interviewers were stationed in the 13 districts near public transport terminals, where they administered the questionnaire conceptualised for this study (Annexure). The questionnaire included (1) socio-demographic data, such as age, gender, occupation and education, (2) behavioural questions related to the compliance with COVID-19 mitigating measures, such as the use of masks, constraints to hand hygiene, and (3) impact of the emergency measures on personal incomes, diet and physical activity. Questions about the sources of information related to COVID-19 in those communities and the perception of the future of the pandemic were added in order to understand related factors to the behaviour. The interview was conducted in Portuguese or XiChangana, and the answers were filed in the Open Data Kit (ODK) questionnaire available on the interviewers' smartphones.

This study was done in a context of emergency related to the pandemic. Thus, questions were formulated according to operational needs. Due to the emergency context, a pilot study to establish validity and reliability was not conducted. However, estimation of internal consistency was done using three sets of questions. Intraclass correlation coefficient were high (0.91 to 1.0) and significant ($p=0.000$).

Statistical analysis

Data cleaning, consistency and missing analysis were carried out to ensure reasonable standards of data quality. For data cleaning, frequency distributions of variables were analysed, to assess the problems of outliers and values out of the expected range were discarded. To evaluate the response to behaviour associated with the Coronavirus containment measures, three stages of statistical analyses were applied.

Firstly, descriptive statistics (means, standard deviations, standard errors, frequencies, percentages) integrated with socio- demographic characteristics were used to assess the response to behaviour related to the Coronavirus containment measures and the impact of staying at home on income generation and practising physical activities.

Secondly, a simple bi-variate analysis was done to explore the association between the risk factors related to the respondent's socio-demographic characteristics and non-compliance to the coronavirus containment measures. It is important to emphasise that indicator variables, or outcomes, were recorded in a manner to express non-compliance with containment measures. The selected indicators for social distancing, were: (a) not staying at home ('1' being out of the home three or more times in last three days and '0' being out of the home two times or less in the last three days); (b) Practising physical activities in groups ('1' being practising physical activities in groups and '0' being practising physical activities alone). The indicator for non-compliance with wearing masks was "not using the mask frequently" ('1' being wearing sometimes or never; '0' being always wearing mask).

The outcome variables related to the immediate impact of containment measures were: (a) income ('1' being loss of income and '0' being no change in income); (b) practising physical activities ('1' being changes in practising physical activities and '0' being no changes).

Chi-square for categorical variables and the Kruskal Wallis test were used to analyse the extent to which each respondent's socio-demographic characteristics are associated with an indicator or outcome related to non-compliance to the coronavirus containment.

In the final stage, statistically significant socio-demographic variables of the respondent were identified in the bivariate analysis and were included in a Binary Logistic Regression model to analyse the strength and direction of the key drivers of outcome indicators related to non-compliance measures and impact on income generation and changes in physical activity

For each one of the logistic regression models, apart from odds ratio information, figures related to how well the data fits the model are reported. These figures include goodness-of-fit test of Hosmer and Lemeshow, classification table and Nagelkerke R^2 . The Hosmer-Lemeshow test is a statistical test for goodness of fit for logistic regression models. It is used frequently in risk prediction models. The null hypothesis is that the observed and expected proportions are the same. The alternative hypothesis is that the observed and expected proportions are not the same.

Ethical considerations

All subjects granted verbal consent prior to the interview according to the procedures approved by the Ethics Committee of the National Institute of Health (Ref:312/CIBS-INS/2020). At the end of the interview, the interviewer briefly gave advice about protective behaviour and a mask was offered to the subjects that did not have one.

RESULTS

Socio-demographic characteristics

A total of 1054 subjects (Males=531, Females=523; Age=35.1±11.9 years) accepted to participated and were interviewed (Table 1). A total of 46 subjects had declined to participate.

Table 1. SOCIO-DEMOGRAPHIC DETAILS

Characteristic	Variables	n	%
Gender	Males	531	50.4
	Females	523	49.6
Age group	18-28	363	34.4
	29-39	346	32.8
	40-50	226	21.4
	51-61	93	8.8
	>61	26	2.5
Education	None	27	2.6
	Primary	175	16.6
	Secondary	356	33.8
	High school	339	32.2
	University	157	14.9
Occupation	Student	150	14.2
	Unemployed	108	10.2
	Employee	494	46.9
	Salesman	291	27.6
	Retired	11	1.0

Compliance with containment measures

The number and proportion of subjects per answer for each question are shown in Table 2. Virtually everyone interviewed declared that they go out frequently (99.4%) while 60.7% declared that they went out three or more times than three times in the last three days. This indicates, on average, one or more times per day. Work, selling goods and shopping were the main reasons for going out.

The majority of the sample indicated that they always used masks (75.9%). Approximately 92% of the subjects declared that they have increased the frequency of washing hands, and 95.2% reported a lack of soap and water as not a limitation. Among those who exercise, 54.7% participated outdoors and only 2.7% online. Exercise in groups was still practised by 54.4% of those who declared that they exercise.

Table 2. COMPLIANCE WITH EMERGENCY MEASURES

Question	Response	n	%
<i>How many times did you go out the last 3 days?</i>	None	6	0.6
	1-2	408	38.7
	3 or more	640	60.7
<i>Reason to not stay at home</i>	Work	473	44.9
	Sail	279	26.5
	Shopping	257	24.4
	Recreation	57	5.4
	Exercise	56	5.3
<i>Frequency of mask use</i>	Never	243	32.1
	Sometimes	11	1.0
	Always	800	75.9
<i>After the pandemic are you washing hands</i>	Same frequency	55	5.2
	More frequently	966	91.7
	Less frequently	33	3.1
<i>Do you have difficulty to wash your hands?</i>	Never	1003	95.2
	Lack of water	26	2.5
	Lack of soap	25	2.4
<i>Where do you exercise?</i>	Outdoor	294	54.7
	At home	175	32.5
	On line	15	2.7
	Outdoor and home	53	9.8
<i>Did you exercise?</i>	Alone	203	45.6
	In group	242	54.4

Impact on income and physical activity

More than half (54.9%) declared that their income was already affected due to loss of clients (29.2%), reduced salary (10.2%), loss of employment (3.1%) and no products to sell (2.1%). Self-reported physical activity was reduced for 30.1% of the subjects (Table 3).

Table 3. IMPACT OF CONFINEMENT MEASURES ON INCOME AND PHYSICAL ACTIVITY

Questions	Response	n	%
<i>Did your income change?</i>	No	476	45.1
	Loss of clients	308	29.2
	Salary reduced	108	10.2
	Loss job	33	3.1
	No products to sell	22	2.1
	Loss of salary	9	0.9
	Other	99	9.4
<i>Did your physical activity change?</i>	No	654	62.0
	Reduced	317	30.1
	Increased	83	7.9

Information and perception about the pandemic

With respect to information about COVID-19, most of the respondents (98.7%) considered that they had received information, but 25.4% think that it is not enough. Concerning their perception of the future, 60.4% declared that they believe that the pandemic will increase (Table 4).

Table 4. INFORMATION AND PERCEPTION

Questions	Response	n	%
<i>Do you receive information about COVID19</i>	Yes	1040	98.7
	No	14	1.3
<i>Do you consider that information about COVID19 prevention is enough?</i>	Yes	786	74.6
	No	268	25.4
<i>What is the source of information</i>	TV	989	93.8
	Cell companies	450	42.7
	Radio	420	39.8
	Friends	290	27.5
	Other	33	3.1
<i>What do you think will happen in Mozambique?</i>	Increase a lot	637	60.4
	Finish soon	197	18.7
	No opinion	220	20.9

Multivariate analysis

A bivariate analysis of socio-demographic characteristics related to preventive behaviours is shown in Table 5 (to follow). Factors related to “Not to stay at home” are significantly different for gender and occupation (Table5). Data suggests that males, sellers and employed people tend to stay at home less frequently. Considering that schools were closed at the time of the study, 48.6% of students reported not staying at home, more than expected.

“Does not use mask” are different for genders (Males=26.9%; Females=21.0%), age groups (younger=36.9%, older=26.9%). Students had the higher percentage (44.6%) and the urban group had higher rates than the peri-urban (29.8% and 22.7% respectively).

With the exception of gender, all other socio-demographic characteristics demonstrated significant differences within sub-groups in “Lose income”. A higher percentage was observed in the 40 to 60 year age group, lower education level, sellers and urban subjects. Changes in exercise habits had no statistically significant relationship with any socio-demographic characteristics.

Three binary logistic regression models were fitted to trace the marginal effect of the key drivers in the outcome variables related to non-compliance and impact of containment measures on loss of income (Table 6). The key drivers of non-compliance are present in Model 1, where the outcome variable is ‘not staying at home’, and in Model 2, with the outcome variable ‘not wearing mask frequently’. While, Model 3, with outcome variable ‘loss of income’, represents the impact of containment measures. The odds ratio (OR) was presented after controlling for multiple confounders with 95% confidence intervals.

Table 5. BIVARIATE ANALYSIS OF SOCIO-DEMOGRAPHIC CHARACTERISTICS AND ATTITUDE AND PRACTICE RELATED TO NON-COMPLIANCE AND IMPACT

Factor	Group	NON COMPLIANCE			IMPACT	
		Do not stay home	Do not use mask	Exercise in group	Lose income	Reduced exercise
Gender	Female	56.0(2.2)	21.0(1.8)	54.3(4.9)	57.0 (2.2)	55.5(3.3)
	Male	64.6(2.0)	26.9(1.9)	50.3(4.0)	53.3(2.1)	54.0(2.7)
	Chi-square (p)	0.01	0.03	0.52	0.28	0.73
Age Group	18-28	58.1(2.5)	36.9(2.5)	58.1(4.8)	46.5(2.6)	53.1(3.4)
	29-39	63.8(2.6)	15.6(1.9)	45.3(5.4)	56.9(2.6)	58.3(3.6)
	40-50	58.4(3.2)	21.6(2.7)	49.0(7.0)	62.8(3.2)	52.2(4.7)
	51-61	65.6(4.9)	10.7(3.2)	66.7(16.6)	66.6(4.9)	51.4(8.5)
	>61	57.6(9.8)	26.9(8.8)	33.3(33.3)	34.6(9.5)	55.5(17.6)
	Kruskall Wallis (p)	0.4	0.000	0.34	0.000	0.8
Education	No education	59.0(9.6)	18.5(7.6)		81.4(7.6)	25.0(25.0)
	Primary	68.0(3.5)	29.1(3.4)	51.8(9.7)	70.8(3.4)	53.0(6.1)
	Secondary	62.3(2.5)	27.8(2.4)	57.1(5.2)	51.9(2.6)	51.1(3.7)
	High school	58.0 (2.6)	21.8(2.2)	48.3(5.3)	53.6(2.7)	55.0(3.6)
	University	56.0 (3.9)	15.9(2.9)	47.9(7.2)	42.0(3.9)	61.4(4.5)
	Kruskall Wallis (p)	0.12	0.016	0.61	0.000	0.34
Occupation	Student	48.6(4.0)	44.6(4.0)	55.5(6.8)	34.0(3.8)	47.0(5.0)
	Unemployed	35.1(4.6)	36.1(4.6)	64.5(8.7)	48.1(4.8)	56.6(7.3)
	Formal employed	59.7(2.2)	16.1(1.6)	44.1(4.0)	42.7(2.2)	54.5(2.9)
	Informal sellers	79.7(2.2)	22.3(2.4)	62.7(7.4)	90(1.7)	61.2(4.6)
	Retired	18.1(12.1)	27.2(14.0)		27.2(14.0)	50.0(50.0)
	Kruskall Wallis (p)	0.000	0.000	0.07	0.000	0.350
Residence	Urban	58.2(3.4)	29.8(3.2)	64.1(6.6)	49.2(3.5)	57.4(4.7)
	Peri-urban	61.3(1.6)	22.7(1.4)	48.7(3.5)	56.2(1.6)	53.9(2.3)
	Chi-square (p)	0.41	0.034	0.56	0.072	0.52

Table 6. LOGISTIC REGRESSION RESULTS FOR KEY DRIVERS OF COMPLIANCE (Not Stay Home AND Not Use Mask) AND IMPACT (Lost Income) OUTCOMES

Factor	Variables	COMPLIANCE				IMPACT	
		Model 1		Model 2		Model 3	
		Not stay home (NSH)		Not use mask (NUM)		Lost income (LI)	
		OR	95%CI	OR	95%CI	OR	95%CI
Gender	Female	ref		ref		ref	
	Male	1.42*	1.07-1.88	1.56*	1.14-2.12		
Age	18-29			ref			
	29-39			0.45*	0.30-0.68	1.07	0.17-1.88
	40-50			0.65	0.42-1.01	1.20	0.81-1.89
	51-61			0.28*	0.13-0.59	1.43	0.08-2.56
	>61			0.60	0.19-1.83	0.34	0.11-1.05
Residence	Urban			ref			
	Peri-urban			0.76	0.52-1.09		
Education	No education			Ref			
	Primary			1.23	0.42-3.81	0.56	0.47-1.92
	Secondary			0.89	0.29-2.69	0.45	0.13-1.48
	High school			0.71	0.23-2.18	0.52	0.15- 1.73
	University			0.61	0.18-1.98	0.43	0.12-1.45
Occupation	Unemployed	ref		ref		ref	
	Student	1.97*	1.13-3.44	1.09	0.62-1.90	0.61	0.35-1.03
	Formal job	1.01	0.57-1.78	0.39*	0.24-0.64	0.80	0.52-1.25
	Vendors	2.09*	1.09-3.98	0.55*	0.52-0.87	9.05*	5.20-15.6
	Retired	0.63	0.12-3.30	0.92	0.17-4.85	0.70	0.14-3.38
Reason to be out	Working #	8.83*	4.70; 13.70				
	Shopping #	2.75*	1.79; 4.23				
	Selling #	11.54*	6.12; 21.50				
	Hanging out #	4.76*	1.76; 13.05				
	Physical activity #	2.73*	1.38; 5.39				
	Visiting friends #	0.84	0.43; 1.65				
	Constant	0.25					

NSH-Hosmer and Lamshow test, 6.8, p=0.55

NUM-Hosmer and Lamshow test, 12.1, p=0.12

LI-Hosmer and Lamshow test, 7.4, p=0.48

Classification table 71%

Classification table 76.9%

Classification table 67.8%

Nagelkerke R²=0.24Nagelkerke R²=0.13Nagelkerke R²=0.26

(Yes=1; No=0)

*Statistically significant= (p<0<0.05)

For Model 1, with outcome variable ‘not staying at home’, the demographic variables included in the model are gender and occupation. The variables correlated significantly with not staying at home. Additionally, reasons for being out of the home were also included in Model 1. The statistically significant ($p < 0.05$) predictors of not staying at home are gender and occupation. Male subjects are more likely to be out of the home than females ($OR = 1.42$). The odds ratio of informal vendors ($OR = 2.09$) and students ($OR = 1.97$) demonstrated that these two occupation groups were more likely to be out of the home than unemployed (reference group), while controlling for all other factors in the model.

When reasons for not staying at home are introduced in the model, the odds ratios vary between two-fold to eleven-fold. The results show that the reasons most likely to be reported by the respondents are informal business ($OR = 11.54$), working ($OR = 8.83$), hanging out ($OR = 4.76$), shopping ($OR = 2.75$) and physical activities ($OR = 2.73$). It is important to note that the model fits the data well. The goodness-of-fit test of Hosmer and Lemeshow results was not statistically significant ($p = 0.92$).

In Model 2, the demographic variables included gender, age, residence, occupation, and education (variables significantly correlated with “not wearing a mask”). Only age, gender and occupation are statistically significant drivers of not wearing a mask. The results from the logistic regression show that young, male and unemployed subjects are the most likely profile of those not wearing masks frequently. Male subjects are 56% more likely not to wear a mask than a female ($OR = 1.56$). Older people (51-61 years) are less likely ($OR = 0.28$), not to wear a mask when compared with younger people (18-28 years, reference group). The odds ratio of informal vendors ($OR = 0.55$) and students ($OR = 0.39$), shows that these two occupation groups were less likely not to wear masks than the unemployed (reference group). Additionally, goodness-of-fit test of Hosmer and Lemeshow, shows that the data fits the data well ($p = 0.12$).

Model 3, where the outcome “loss of income” is related to the impact and the variables included age, education and occupation, because they were statistically significantly associated with outcome variable losing income, in the bivariate analysis. However, in the multiple logistic regression, only occupation was statistically significant. That is, informal vendors are the occupation group more likely to lose income ($OR = 9.05$) while controlling for other factors linked to respondent’s demographic characteristics. The goodness-of-fit test of Hosmer and Lemeshow, was not statistically significant ($p = 0.12$), therefore the model fits the data reasonably well.

DISCUSSION

The main purpose of this cross-sectional study was to describe and understand the response of the population of the metropolitan areas of Maputo and Matola to behaviour changes associated with the Coronavirus containment measures, to assess the impact of these measures on variables, such as habitual physical activity and family income, as well as the association of the degree of compliance and impact with some demographic characteristics.

The main findings from the study suggest that some behaviours, but not all, were changed positively, for example, the use of face masks and the frequency of washing hands increased. In the opposite direction, a large part of those who exercise maintain their habit of training in groups and almost all subjects still need to go out daily. The main reasons for this attitude are the need to go to work, sell their products and shop. Concerning the impact, more than half of the subjects have already lost their income and habitual physical activity decreased by 30%. Information about COVID 19 prevention seems to be widely disseminated.

From the behaviour changes theories, there is a common agreement that any health-related change behaviour is linked to an individual's perception of a threat to their personal health and their belief that the recommended change of attitude will reduce this threat (Rosenstock *et al.*, 1988). However, other conditions seem to be essential to the success of this change, like environmental constraints, individual skills, peer pressure, self-efficacy and the balance between advantages and disadvantages of the change.

Based on these assumptions, it may be expected that the response to the changes in behaviour for Coronavirus prevention may be correlated to the different contexts and socio-demographic specificities. When considering the specific context of the pandemic in Mozambique, it is reasonable to assume that the study responses were influenced by the measures taken by government, fear of the disease, the enforcement measures carried out by the authorities and the need to survive. The data from this study do not capture the determination of each mediator, but it should be noted that each one of them had a significant role in this study.

Confinement

Confinement is one of the most advertised recommendations to prevent Coronavirus spread, represented by the generalised advertisement "Stay At Home". Although with several concerns (Coetzee & Kagee, 2020), there is a generalised idea that this is a determinant strategy (Tang *et al.*, 2020; Zhang *et al.*, 2020). The results of this study suggest that almost no one stays at home, which is in line with the anecdotal observations and the regular complaints of the authorities that people are not staying at home and mobility in the city is practically unchanged. Reasons declared for not staying at home are mainly related to survival activities, such as work, selling products and shopping.

The results of the logistic regression analysis indicates that vendors and students have significantly higher odds for not staying at home. If this is justified for street vendors that depend on daily sales to survive, the fact that schools are closed makes the students' attitude less justified. One hypothesis for this result could be related to the fact that, in this context, a large number of children and adolescents (students) are also vendors.

Egger *et al.* (2020) consider that there are five criteria for low-income countries to be able to establish lockdowns, namely (1) access to safe drinking water at home, (2) adequate sanitation, (3) a source of reliable energy, (4) access to information or communication technology and (5) having a permanent source of income or savings. Considering the economic data from Mozambique, only 11.6% of the population in urban areas and 1.8% in rural areas achieve all five conditions and would be completely ready for a lockdown. Analysed separately for urban areas, these proportions would be 58.3% for water, 86.4% for sanitation, 70.3% for source of power, 88.3% for technology and 16.5% for income. This situation is shared by the vast majority of the Sub-Saharan African countries (Buonsenso *et al.*, 2020; Dzobo *et al.*, 2020).

It seems clear that, staying at home is not an option, nor would it be a reasonable expectation for the majority of the population in the absence of significant state help. To these objective factors, a socio-cultural trait of determinants must be added for a society, where the importance of socialisation is known to be very high and where families living in small houses is very common.

Masks

Approximately 76% of the subjects declared that they always wore a mask and only 32% reported not wearing a mask at all. Due to a general lack of public health approved masks in Mozambique, almost all masks are of homemade fabric. The results were surprising, since those masks are reported to be very uncomfortable, and we would not expect that this habit would be easy to assume and sustain. Unfortunately, questions about the reasons why people adhere to mask wearing were not asked. However, fear of breaking the mandatory law and media reports of police's repressive attitudes towards people who do not use masks, could be an important contribution. Although there is evidence of significant protective effects of masks (Eikenberry *et al.*, 2020; Ma *et al.*, 2020), concerns about incorrect donning, doffing and adjusting of masks must receive attention. Extensive education about how to properly and safely wear and manage a mask, may be appropriate.

Washing hands

Surprisingly, a large majority of the subjects reported not having difficulties in finding water and soap to wash their hands (95.2%), as well as having increased the frequency of washing hands (91.7%). Considering the lack of public sanitary infrastructure, this was an unexpected finding. For example, it is well known that large public facilities, like schools for example, have no water supply. The generalised official propaganda about this behaviour and the mandatory rule for public services to provide hygiene products to all citizens, may explain this positive result.

Income

The state of emergency declared by the government has caused a serious breakdown in economic activity. This is probably one of the biggest, if not the biggest impact of the pandemic containment measures. After forty-five (45) days since the declaration of the state of emergency, more than half of the study subjects declared to be affected in some way and those numbers should increase as time goes by. Considering there were no economic relief measures created to reduce the impact on the loss of income as was done in most developed countries, large social-economic problems are expected and must be taken into account by authorities. It was suggested that, in the presence of a social crisis, trust in official institutions would be a determinant for the management of the situation (Egger *et al.*, 2020). It seems that one of the crucial sources of trust would be the measures to reduce the impact of COVID-19 prevention measures on the family income. So far, there is no public strategies to help formal and informal economic sectors to face the loss of income, which could be a negative factor for the population behaviour towards the prevention attitudes.

Physical activity

Risk factors for non-communicable diseases in Mozambique in general, and Maputo in particular, have increased over the last decades. For instance, national prevalence in overweight+obesity in adults were 18.3% in 2005 and increased to 30.5% in 2015 (Fontes *et al.*, 2019), while urban school age children and adolescents, overweight+obesity prevalence change in girls, from less than 6.9% in 1992 to 20.3% in 2012 (Dos Santos *et al.*, 2014). Although no objective data is available, there is an evident growth of individuals exercising outdoor and the number of gyms increased.

Since the state of emergency, with the gyms and schools closed, together with a decrease in labour activity, an explosion of people exercising outdoors was observed. The increase was to such an extent, that authorities became concerned about the chances of spreading the virus outdoors. More than half of the current respondents declared that they have been exercising outdoors during the pandemic, 32.5% at home and only 2.7% online. On the other hand, 30% declared that they reduced their exercise time because of the pandemic. This illustrates a negative effect of the pandemic on physical activity habits. It is clear that despite large local and international online exercise programmes available, they are not being used extensively, probably due to the limitations of the availability of the internet.

Socialisation is recognised as an important factor for exercise motivation, which leads to a trend to perform activities in groups (Macdonald-Wallis *et al.*, 2012; Hall *et al.*, 2020). However, the state of emergency obliges changes in behaviour including social distancing, which implies that individuals exercise alone. Nevertheless, the percentage of subjects that declared they still exercise in groups is still high (54.4%) and no socio-demographic characteristics were able to differentiate them.

This contradicts the prevention measures. It appears that people, who declare that they wash their hands frequently and use masks, do not believe in the advantage of participating in exercise alone. Repressive action has been made for groups, as well as exercise at home advocacy. Although it is recognised that physical activity is a healthy behaviour even for the specific protection of COVID-19 (Chen *et al.*, 2020), it seems that the pandemic will result at least in a temporary reduction in habitual public physical activity, which may require that health authorities should pay attention to this.

Advertising

Advertising about the Coronavirus prevention is believed to have been important for the success of the spread of the message. Almost all the subjects declared to be informed. Sources of information are diverse, but television seems to be the most prevalent, which is an important finding to take into account. Although much effort is made to use social media, such as Instagram and Facebook, it seems that TV is primarily the most effective in the context of Mozambique. This result is similar to the official data on communication about COVID-19 in the country (Manjate *et al.*, 2020).

Risk perception about COVID-19

A large proportion of the subjects believe that the contagion will increase significantly, which may mean that there is a social consciousness of the problem. There is no data about the perception and its role on people's behaviour. A mixed qualitative and quantitative survey, done in seven different districts of Mozambique that included urban and rural populations (INS, 2020), showed that less than half of the population (48%) declared fear of the virus in the area where they live. This means a large number of people are not afraid or consider that there is nothing that they can do to avoid the contagions. Furthermore, there is no relationship between the question about the duration of the pandemic and any behaviour.

There are already some studies about risk perception related to COVID-19 (Honarvar *et al.*, 2020; Kebede *et al.*, 2020). However, not all have studied the hypothetical relationship between risk perception and change in behaviour, which is considered related to a protective behaviour since perception of risk encourages good practices (De Bruin & Bennett, 2020). Fear is one important way to motivate people to change behaviour related to COVID-19, particularly by

the media and official statements. This includes the argument that vulnerability, perceived risk and fear can significantly increase engagement in preventive behaviours related to the coronavirus pandemic. This is being criticised by some who consider that the strategy of using fear is associated with very low assimilation of information and education and that it only increases the mental stress of the public (Manjate *et al.*, 2020; Nguyen *et al.*, 2020). Since risk perception and fear are highly related to cultural factors, it seems important to develop specific studies addressing this topic.

LIMITATIONS

This study was carried out six weeks after the state of emergency was declared in Mozambique (May 2020). It was conducted in an environment of uncertainty and significant concern, as there was very little knowledge about the pandemic. The urgent need for information to help the government and authorities to lead in the face of the pandemic, limited the possibility for a better study approach, particularly in the sample selection, geographical area (which excluded rural areas), collection of detailed and objective data, as well as more impact variables, particularly health-related factors. Another limitation was the lack of the estimation of reliability of the questionnaire. Notwithstanding the constraints, the collected information and the consequent analysis should contribute to the management of the pandemic.

CONCLUSION

Studies of this nature and on this pandemic in Mozambique and in Africa are still scarce in the literature. Some studies have been done in Mozambique (CISM, 2020; Dzinamarira *et al.*, 2020; INS, 2020) but this information is available only in short reports. In general, the results of those studies were similar to the present study. It appears that people everywhere are not staying at home, and all for the same reasons. The use of masks is widespread where there is control, there is a loss of income in the formal and informal economy and people are aware of the pandemic. Washing hands seem to be the most successful measure in all studies.

In summary, the strategy for preventing the spread of the corona virus proposed worldwide found serious constraints in its application in the urban context of Mozambique. These results seem to confirm the concerns previously published about the strategies of COVID-19 contention in the context for Africa (Buonsenso *et al.*, 2020; Dzinamarira *et al.*, 2020; Dzobo *et al.*, 2020; Kapata *et al.*, 2020; Mboera *et al.*, 2020).

Acknowledgement

The authors acknowledge the Pedagogic University of Maputo, Eduardo Mondlane University, National Institute of Health and the City Councils of Maputo and Matola for their support of this study, all the interviewers who collected the data and those who provided technical support. This study was funded by the National Institute of Health of Mozambique.

Contributors

All authors conceived the research; AP, TD, MET, ER, SP, ADA and IM collected the data; AP, AD, CL and IM performed the statistical analyses. AP, AD, CL, TD, MET, ED, SP, ADA and IM interpreted the data, wrote and reviewed the manuscripts with AP being primarily responsible for the final manuscript.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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(Subject editor: Prof. Hanlie Moss)

ANNEXURE
QUESTIONS FOR INTERVIEW

1. **Gender** Male Female
2. **Age**
3. **What is your marital status?**
Single Married Divorced Widower
4. **What is your occupation?**
Student Unemployed Employee Informal seller Retired
5. **What was the last education level you completed?**
No education Primary Secondary Up secondary University
6. **What is your neighbourhood?**
7. **How many times did you leave home in the last 3 days?**
8. **State the reasons why you left home.**
Work Sell Shopping Recreation Exercise Other (specify)
9. **Why are you not at home at this moment?**
Work Sell Shopping Recreation Exercise Other (specify)
10. **Do you use a mask?** Always Sometimes Never
11. **Do you wear mask in each of the given situations?**
Shopping Outdoors Public transport Other (specify)
12. **Since the start of the pandemic, how often did you wash hands?**
Less times No change More
13. **Are you finding it difficult to wash hands?**
I do not I have difficulty to find water I have difficulty to find soap
14. **Did your income/job change?**
No I lost my job My salary decreased I have a job but no salary
I lost clients I reduced the products I sell Other changes (specify)
16. **If you are student (skip if not a student) do you attend classes?**
I am do classes online I am studying by doing homework I am do not have classes
17. **Before the pandemic, did you exercise?**
Always Sometimes Never
18. **Where did you used to exercise before the pandemic?**
Gym Outdoor Home Sport Club I did not exercise
19. **Since the beginning of the pandemic, what was the status of your physical activity?**
Did not change Reduced Increased
20. **Where do you do the exercise?**
Outdoors Home Online I am not exercising
21. **Before the pandemic, how did you exercise?**
Alone In a group Both I did not exercise
22. **How do you exercise currently?**
Alone In a group Both I did not exercise
23. **Are you receiving information about COVID-19?**
Yes No
24. **From what sources did you receive COVID-19 information?**
TV Radio Cell messages Posters and flyers
Community leaders Friends and family
25. **Do you consider that you are receiving enough information?**
Yes No
26. **What do you think will happen with the epidemic in Mozambique?**
It will finish soon It will last for a few weeks It will increase a lot I have no opinion