









OPEN LETTER

REVISED Kenya's response to the COVID-19 pandemic: a balance between minimising morbidity and adverse economic impact [version 2; peer review: 2 approved, 2 approved with reservations]

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v2 First published: 14 Jan 2021, 4:3
<https://doi.org/10.12688/aasopenres.13156.1>
Latest published: 29 Mar 2021, 4:3
<https://doi.org/10.12688/aasopenres.13156.2>

Abstract

Coronavirus disease 2019 (COVID-19) has ravaged the world's socioeconomic systems forcing many governments across the globe to implement unprecedented stringent mitigation measures to restrain its rapid spread and adverse effects. A disproportionate number of COVID-19 related morbidities and mortalities were predicted to occur in Africa. However, Africa still has a lower than predicted number of cases, 4% of the global pandemic burden. In this open letter, we highlight some of the early stringent countermeasures implemented in Kenya, a sub-Saharan African country, to avert the severe effects of the COVID-19 pandemic. These mitigation measures strike a balance between minimising COVID-19 associated morbidity and fatalities and its adverse economic impact, and taken together have significantly dampened the pandemic's impact on Kenya's populace.

Keywords

Kenya, COVID-19, pandemic response, transmission, disease control measures




This article is included in the [Coronavirus \(COVID-19\)](#) collection.

Open Peer Review

Reviewer Status    

	Invited Reviewers			
	1	2	3	4
version 2 (revision) 29 Mar 2021	 report			
version 1 14 Jan 2021	 report	 report	 report	 report

- Gisele Umvilighozo** , Simon Fraser University, Burnaby, Canada
Francis Mwimanzi, Simon Fraser University, Burnaby, Canada
- Peninah Muthoni Wairagu** , Technical University of Kenya, Nairobi, Kenya
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Any reports and responses or comments on the
article can be found at the end of the article.

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Author roles: **Wangari EN:** Conceptualization, Writing – Original Draft Preparation, Writing – Review & Editing; **Gichuki P:** Conceptualization, Writing – Original Draft Preparation, Writing – Review & Editing; **Abuor AA:** Conceptualization, Writing – Original Draft Preparation, Writing – Review & Editing; **Wambui J:** Conceptualization, Writing – Original Draft Preparation, Writing – Review & Editing; **Okeyo SO:** Conceptualization, Writing – Original Draft Preparation; **Oyatsi HTN:** Conceptualization, Writing – Original Draft Preparation; **Odikara S:** Conceptualization, Writing – Original Draft Preparation; **Kulohoma BW:** Conceptualization, Supervision, Writing – Review & Editing

Competing interests: No competing interests were disclosed.

Grant information: This work is supported by the African Academy of Sciences (AAS) through the AAS Affiliates Fellows programme. BWK is an AAS affiliate fellow.

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

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How to cite this article: Wangari EN, Gichuki P, Abuor AA *et al.* **Kenya's response to the COVID-19 pandemic: a balance between minimising morbidity and adverse economic impact [version 2; peer review: 2 approved, 2 approved with reservations]** AAS Open Research 2021, 4:3 <https://doi.org/10.12688/aasopenres.13156.2>

First published: 14 Jan 2021, 4:3 <https://doi.org/10.12688/aasopenres.13156.1>

REVISED Amendments from Version 1

1. We have revised the text to describe R_0 more clearly.
2. We have revised the text to include “within urban cities” migration
3. We have revised the text to include local manufacturing and export of personal protective equipment (PPE) during the COVID-19 pandemic. PPEs were primarily imported prior to the pandemic.
4. We have revised the text to include distribution of PPEs by the civil society and government.
5. We have revised the text to include statistics on job losses across all sectors in addition to the example of how the pandemic affected the tourism industry.
6. We have revised the text to describe examples of the efforts in the 8-point economic stimulus program 8-point economic stimulus program.
7. We have also responded individually to each peer review report.

Any further responses from the reviewers can be found at the end of the article

Disclaimer

The views expressed in this article are those of the authors. Publication in AAS Open Research does not imply endorsement by the AAS.

The world is experiencing a significant public health threat due to the global coronavirus disease 2019 (COVID-19) pandemic. The COVID-19 pandemic overshadows recent outbreaks of severe acute respiratory syndromes (SARS) and Middle East respiratory syndrome (MERS) in 2003 and 2012 respectively, which are also caused by viruses that are closely related genetically¹. The COVID-19 pandemic has forced all affected countries to adopt drastic response measures, which included imposing total lockdown of cities and even countries, due to its rapid person-to-person transmission rates^{2,3}. This pandemic is now established in all 54 African countries and coincides with other humanitarian emergencies⁴. Although Africa still bears a small proportion (4%) of the global pandemic morbidity burden, the WHO forewarns that if left unchecked, COVID-19 could result in nearly a quarter of a billion morbidities, and 150,000 fatalities within a year⁵. Scientists still remain puzzled by why the pandemic seems to have “spared” Africa, which has fragile healthcare systems⁶⁻⁸. Several hypotheses have been advanced to explain this occurrence, that include: warmer climate that does not favour the viral pathogen viability, fewer COVID-19 associated deaths because of a comparatively younger population, lower case numbers due to inadequate testing, population-wide immune priming due to previous exposure to other infectious diseases, and genetic factors that protect Africans from severe disease^{6,7,9}. The relative contribution of these factors still remains unknown. We opine that it is Africa’s previous experience with life-threatening infectious disease outbreaks, for example Ebola, HIV, and malaria that led to an overreaction by African states to implement a raft of stringent countermeasures to protect their healthcare systems from being overwhelmed. Governments in African countries moved with commendable speed to implement countermeasures

at early stages of COVID-19 detection within their borders to restrain widespread disease and its adverse effects¹⁰. However, these control measures are thought to be unsustainable and projected to have negative and inequitable impacts in resource poor settings¹¹. In this open letter, we highlight some of the countermeasures against COVID-19 transmission in Kenya, which intend to strike a balance between minimising COVID-19 associated morbidity and fatalities and its adverse economic impact.

Physical distancing minimises person-to-person COVID-19 transmission in a population. This protects individuals at greatest risk of presenting poor infection outcomes from both symptomatic and asymptomatic infected individuals, thereby restricting an increase in the basic reproduction number (R_0)^{11,12}. R_0 is a proxy measure of pathogen transmissibility representing the number of individuals infected by a single infected individual in a population, and higher values indicate increasing transmissibility^{13,14}. In Kenya, the government imposed a nationwide dawn to dusk curfew; and restricted movement within urban areas with high COVID-19 transmission rates, as well as, into and out of urban cities with COVID-19 incidences to rural areas with lower incidence rates. The majority of the older demographic reside in rural areas; and this effort restricted mass migrations to rural areas as a result of economic distress in urban settings, leading to consequent infection of the elderly, and more vulnerable minorities¹⁵. Learning institutions and day-care centres were closed. Workplaces that do not provide essential services were advised to allow individuals to work from home; and effect physical distancing measures in the event that workers were absolutely required to access their workstations. All mass gatherings, faith-based events, festivals, conferences and meetings, trade fairs, sporting and cultural events were prohibited to minimise person-to-person contact. The rationale was that it was challenging to maintain physical distance for large crowds, for example at the exit and entrance spaces or even in public transportation¹⁵. However, the success of these countermeasures requires implementation over an extended period. Social contact with colleagues, family, and friends via digital media, for example over the phone or Internet, encouraged adherence to physical distancing. The government launched a network of giant internet-enabled balloons in-conjunction with Google to deliver emergency Internet across the country¹⁶. This Internet connection was also used for e-learning, working from home, and fostered e-commerce.

Good personal hygiene and sanitization measures are critical for COVID-19 control. Kenya launched nation-wide media campaigns to educate the citizens on the proper handwashing techniques and use of face masks immediately after the first COVID-19 case was detected in March 2020. These campaigns recommend use of soap and running water, 70% alcohol-based sanitizer or 0.1% sodium hypochlorite to wash hands and clean surfaces. Local artisans in the informal business sector were given financial support to assemble handwashing stations and sanitization equipment using available raw materials and re-cycled parts that could be rapidly distributed for use across the country. Fumigation of infection hotspots, for example markets, public transport, and hospitals, was performed routinely.

Handwashing was also mandatory prior to entry of any public premises and before boarding public transportation. In Kenya, personal protective equipment (PPE) was primarily imported prior to the COVID-19 pandemic. However, their necessity and shortfall during the pandemic provided an opportunity of capacity and technological leapfrogging, and PPEs are now manufactured locally, and also exported to the wider East African Region. The ministry of health and healthcare stakeholders developed new protocols and policies on handling of deceased remains and conducting funerals. For example, funerals were restricted to a maximum of 15 attendees practicing physical distancing¹⁷. Civil society organisations and the government joined efforts to restrict widespread COVID-19 disease by providing personal protective equipment such as face masks, gloves, sanitisers, medical supplies, soap, as well as water and food rations to affected informal settlements across Kenya¹⁸. Community social workers were also deployed to raise awareness to the public and educate them on physical distancing and handwashing, COVID-19 prevention control measures, and psychosocial support to affected communities¹⁸.

Comprehensive surveillance and detection systems enable data collation and analyses to establish COVID-19 transmission dynamics and societal impact. These systems should enable control at three levels¹⁹: (i) First, enable rapid detection, isolation, testing and management of suspected cases. (ii) Secondly, guide the implementation of control measures and be able to contain outbreaks among vulnerable populations, monitor long-term epidemiologic trends and evolution of SARS-CoV-2 virus, and evaluate the impact of the pandemic on the healthcare system. (iii) Finally, incorporate capacity sufficient for understanding the co-circulation of SARS-Cov-2 virus and other respiratory viruses. These systems provide robust evidence used for developing implementation policies required for disease management²⁰. In Kenya the integrated disease surveillance and response (IDSR) system guides the rapid detection, reporting, management and treatment of the reported infection cases²¹. Seroprevalence and genomic studies provide estimates for the level of COVID-19 infection cases across Kenya, and determine genomic diversity of strains in circulation²²⁻²⁴. In addition, sentinel surveillance of influenza-like illness and other acute respiratory infections using the global influenza surveillance and response system (GISRS) has allowed robust monitoring of community transmission of COVID-19, and provides insight on co-circulation of respiratory viruses²⁵. Consequently, this has informed more robust and customised public health responses. As part of the East African community response unit (EARCC), Kenya and other partner states continue improve the region's response capacity on disease prevention, safety and surveillance at border points²⁶.

The Ministry of Health communicates daily via all media outlets the number of confirmed cases, fatalities, recoveries, overall COVID-19 related bed occupancy in various hospitals, and the prevalence in all 47 counties. They also remind all citizens to continue taking precautions not to contract COVID-19; and provide contact details on how and where to seek assistance if you present symptoms. In addition the

government has established the COVID-19 risk communication and community engagement sub-committee, in conjunction with media agencies, healthcare stakeholders and the International Organization for Migration (IOM) to enhance strategic communication and community engagement, promote trust and influence risk perception²⁷⁻³⁰. Community health workers were also deployed to provide mental health and social support, for example managing loss or grief³¹.

Mitigation measures that minimise COVID-19 associated morbidity and fatalities have resulted in economic losses and a decline in global economic activity. For example, the tourism and hospitality industry a major foreign exchange earner for Kenya suffered huge losses due to global restriction of movement. Kenya National Bureau of Statistics (KNBS) estimates that up to 1.7 million Kenyans across all sectors lost employment between March and May of 2020³².

The government unveiled an 8-point economic stimulus program incorporated in the national budget to stimulate economic activity and safeguard livelihoods³³. Examples include: A cash transfer programme targeting the elderly, poor and vulnerable was implemented to safeguard the dignity and welfare of the most severely affected. Hiring of ten thousand teachers and purchase of locally fabricated school equipment to support digital learning. Provision of seed capital to small and medium enterprises through a credit guarantee scheme, as well as fast-tracking of tax refunds and other pending payments. Duty remission on raw materials used for domestic manufacturing was implemented. Hiring of additional healthcare workers and expansion of bed capacity in public hospitals. Supply of farm inputs to small scale farmers through an e-voucher scheme. Provision of soft loans to hotels and related establishments. Rehabilitation of wells, water pans and underground tanks in arid and semi-arid areas and flood control measures to protect communities from adverse environmental effects during the COVID-19 pandemic. Enforcing policies that support the purchase of locally manufactured products. A post COVID-19 economic recovery strategy was formulated to dampen the adverse economic effects and reposition the economy on a steady and sustainable growth trajectory³⁴. We posit that more effort should be directed towards achieving a delicate balance between minimising COVID-19 associated morbidity and preventing an economic recession, which is paramount to avoid reversing the gains made on the Sustainable Development Goals. We conclude that overall, these response measures together with others have significantly dampened the pandemic's impact on Kenya's populace.

Data availability

Underlying data

No data are associated with this article.

Acknowledgements

We acknowledge Rosaline Macharia and George Obiero, from the Centre of Biotechnology and Bioinformatics, University of Nairobi, for their useful discussions on the manuscript.

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Open Peer Review

Current Peer Review Status:    

Version 2

Reviewer Report 17 May 2021

<https://doi.org/10.21956/aasopenres.14329.r28533>

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Gisele Umviligihozo 

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Francis Mwimanzi

Faculty of Health Sciences, Simon Fraser University, Burnaby, CA, Canada

Edwin N. Wangari and colleagues adequately revised the article according to our comments and suggestions, we are satisfied with their response and have no further comments.

We noticed that the authors' response, referred to article number 28 as one addressing the adverse economic impact of SARS-CoV-2 on Kenyan's livelihoods while the correct reference article number is 32, we suggest to correct this in the author's response for accuracy.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Virology, Immunology

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 01 March 2021

<https://doi.org/10.21956/aasopenres.14259.r28383>

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**Brian Godman** ¹ School of Pharmacy, Sefako Makgatho Health Sciences University, Pretoria, South Africa² Strathclyde Institute of Pharmacy and Biomedical Sciences, Glasgow, UK

Thank you - I enjoyed reading this Open letter. However, I have a number of concerns. Firstly, there is a lack of documentation of activities in Kenya and also how these relate to other African countries to provide future direction. A paper I was involved with, Ogunleye *et al.*, with co-authors from Kenya, extensively documented both healthcare and financial activities to help prevent the spread of the virus across Africa and the implications going forward. It would be good to add to this for Kenya, building on the comments made - especially with Africa learning from other infectious diseases in Ogunleye OO *et al.* (2020)¹.

There have also been concerns with the misinformation regarding COVID-19 and treatments - especially important in countries with high co-payment levels such as Kenya - as discussed in a paper of mine, Sefah I *et al.* (2020)². Encouragingly, in Kenya there is limited/no self-purchasing of antimicrobials unlike a number of other African countries. We are also seeing African countries innovate, etc., to help with the pandemic - providing opportunities for the future demonstrated in another paper I was involved in, Afriyie DK *et al.* (2020)³. It would be good to build on this for Kenya, along with potential plans about greater local production of medicines, to reduce issues of shortages in the future and help with the economy going forward.

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Is the rationale for the Open Letter provided in sufficient detail?

No

Does the article adequately reference differing views and opinions?

Yes

Are all factual statements correct, and are statements and arguments made adequately supported by citations?

Yes

Is the Open Letter written in accessible language?

Yes

Where applicable, are recommendations and next steps explained clearly for others to

follow?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: My area of research includes both infectious and non-infectious diseases across Africa and wider.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 13 Mar 2021

Benard Kulohoma, University of Nairobi, Nairobi, Kenya

We would like to thank the reviewer for their constructive comments that have strengthened our manuscript. The aim of which was to highlight countermeasures taken in Kenya. A separate article describing countermeasures taken across Africa by the authors has already been described in the text (Reference 3).

Competing Interests: None

Reviewer Report 01 March 2021

<https://doi.org/10.21956/aasopenres.14259.r28411>

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**Peter Macharia**

Population Health Unit, KEMRI Wellcome Trust Research Programme, Nairobi, Kenya

The article summarises measures put in Kenya in response to COVID-19. I have a few suggestions on how the manuscript might be improved.

The authors should be more specific on measures that were put into place. For example, mentioning the major urban areas where movement in/out was restricted, specific areas within Nairobi where the movement was constrained, etc. In its current form, the article is more general and has not been fully localized to the Kenyan context.

The authors should appreciate that the measures put into place had a temporal and spatial aspect. A chart and/or a map(s) could improve the article by providing a visual of the measures put into place over time in Kenya and citing those that were in specific counties. Also, include the timeline that is being addressed in the article e.g. between March 2020 to February 2021

The article has not tackled the other side of the coin, the effects of COVID-19 on the economy and how the government of Kenya and other stakeholders responded to minimize the effects.

The article mentions the value seroprevalence, genomic and sentinel surveillance studies had on Kenya. These are just but a few themes. Consider adding other lines such as disease mapping, economic modelling, gender-related studies among others

The message captured by the title has not been substantiated in the article. The balance between minimizing morbidity and adverse economic impact has not been elucidated in the Kenyan context

Provide references to sources of the measures cited

Is the rationale for the Open Letter provided in sufficient detail?

Partly

Does the article adequately reference differing views and opinions?

No

Are all factual statements correct, and are statements and arguments made adequately supported by citations?

Partly

Is the Open Letter written in accessible language?

Yes

Where applicable, are recommendations and next steps explained clearly for others to follow?

Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Spatial epidemiology/ health geography

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 13 Mar 2021

Benard Kulohoma, University of Nairobi, Nairobi, Kenya

We would like to thank the reviewer for their constructive comments that have strengthened our manuscript. We have revised the manuscript to make it more clear that movement was also restricted within urban areas with high rates of COVID-19 transmission. The concise Open Letter article is intended to give a general perspective of the

countermeasures taken across Kenya. It would be beyond the scope of the article to describe countermeasures taken in each County or administrative unit in Kenya. We did not perform temporal and spatial analyses and therefore do not present data or findings on the same. We have described the adverse effects of COVID-19 on the economy giving an example of the tourism sector, which is one of the major contributors to Kenya's GDP, and highlighted that the government has implemented a detailed 8-point economic stimulus program incorporated in the national budget to stimulate economic activity and safeguard livelihoods (Reference 28). In addition we now provide more examples. We have revised the manuscript to highlight societal impacts, for example the loss of jobs across all sectors affecting up to 1.7 million Kenyans, and provide additional references, with more details.

Competing Interests: None

Reviewer Report 24 February 2021

<https://doi.org/10.21956/aasopenres.14259.r28388>

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Peninah Muthoni Wairagu 

Technical University of Kenya, Nairobi, Kenya

The open letter highlights the mitigation measures employed by the Kenyan government to minimize the COVID-19-related morbidities and mortalities in Kenya and their impact on the economy.

Comments on the letter include;

1. The title of the letter suggests that the authors have analyzed the mitigation measures employed and their economic impact. However, the content of the letter is skewed towards the mitigation measures employed and does not adequately discuss the economic impact of these measures. There is only a brief mention on the effect on tourism, which only forms a part of the Kenyan economy. The mitigation measures also had effects on other sectors of the economy, such as employment, export and import business, manufacturing among others. It is also important for the authors to highlight that not all of the impact was negative, as seen in the manufacture of personal protective equipment (PPEs), soaps and sanitizers as well as service industries such as internet services provision.
2. The use of PPEs was a major aspect of the mitigation measures employed by the government to fight COVID-19, yet it is not mentioned in the open letter. It is important for the authors to include a discussion on PPEs especially because their manufacture locally had positive impact on the economy.
3. Part of the reason why Africa was expected to bear the greater burden of COVID-19 was due

to the poor health care systems including the lack of enough hospitals and healthcare workers. The government sought to mitigate this by hiring health workers and some counties built hospitals. A discussion on this can also be included to make the letter more comprehensive.

4. The authors need to give a brief description on reproduction number (R_0) since it is not common knowledge.

Is the rationale for the Open Letter provided in sufficient detail?

Yes

Does the article adequately reference differing views and opinions?

Partly

Are all factual statements correct, and are statements and arguments made adequately supported by citations?

Yes

Is the Open Letter written in accessible language?

Yes

Where applicable, are recommendations and next steps explained clearly for others to follow?

Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Cancer

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 13 Mar 2021

Benard Kulohoma, University of Nairobi, Nairobi, Kenya

We would like to thank the reviewer for their constructive comments that have strengthened our manuscript. We have now provided examples of these measures in the 8-point economic stimulus program (Reference 28). We have revised the manuscript to highlight the manufacture, distribution and use of PPEs is restricting COVID-19. Capacity building to strengthen healthcare systems across Africa has already been highlighted at detail by the authors in a different article (Reference 3). We have also made revisions to the manuscript to give a brief description of reproduction number (R_0).

Competing Interests: None

Reviewer Report 24 February 2021

<https://doi.org/10.21956/aasopenres.14259.r28384>

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Francis Mwimanzi

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I read with interest the article authored by Edwin N. Wangari and colleagues that presented Kenya's response to the COVID-19 pandemic: a balance between minimizing COVID-19 morbidity and the adverse economic impact.

The article dealt with an important topic that deserves to be accepted. I have minor suggestions for improvement.

This open letter clearly detailed the Kenya's COVID-19 response and its impact on reduction of COVID-19 morbidity and spread, however it lacks sufficient supporting information on the economic component. The authors noted that mitigation measures that minimize COVID-19 associated with morbidity and fatalities have resulted in losses and a decline in a global economic activity but only mentioned an impact on the tourism and hospitality industry in Kenya. The article would gain strength by providing more detailed information on the negative economic impact of the COVID-19 response on other national economic activities and international trade that mainly contribute to the general livelihoods of Kenyans, such as agriculture, livestock, fishing and transport industries as well as small businesses (local markets, bars, restaurants, fashion houses and beauty salons).

To further substantiate the argument, the authors could highlight critical points regarding the balance between the response to COVID-19 and its impact on the declining economy that is lacking in the government's economic stimulus packages.

Is the rationale for the Open Letter provided in sufficient detail?

Yes

Does the article adequately reference differing views and opinions?

Partly

Are all factual statements correct, and are statements and arguments made adequately supported by citations?

Yes

Is the Open Letter written in accessible language?

Yes

Where applicable, are recommendations and next steps explained clearly for others to follow?

Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Virology, Immunology

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.

Author Response 13 Mar 2021

Benard Kulohoma, University of Nairobi, Nairobi, Kenya

We would like to thank the reviewer for their constructive comments that have strengthened our manuscript. It is beyond the scope of the concise. We have now provided examples of these measures in the 8-point economic stimulus program (Reference 28).

Competing Interests: None