

Role and commercialisation of indigenous knowledge in the control of Covid-19 pandemic

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ABSTRACT

Coronavirus has been one of the most feared, and dangerous diseases, which killed thousands of people, if not millions, across the world. The disease caused many challenges such as low economic growth, deaths, closure of schools, and even worsened poverty and vulnerability across the globe. The disease is caused by a virus and has no cure yet. In an effort to mitigate health challenges indigenous knowledge systems have been reached out to as a panacea to control the pandemic; witnessing a paradigm shift from scientific to indigenous systems. It has been proven in many African countries like Cameroon, Madagascar, Zambia, and Zimbabwe to be one of the best ways to control coronavirus given the high recovery rates from those infected. Therefore, the paper's objective is to assess the role and commercialisation of indigenous knowledge in controlling the Covid-19 pandemic. A comprehensive search of literature was undertaken to come up with published paper on indigenous knowledge used to control Covid-19. Interviews and questionnaires were also used to collect data on indigenous knowledge by local people. The results show that *Zumbani* (*Lippia javanica*) use became popular in countries like Zimbabwe, with almost everyone using it either in tea, drinks, porridge or steaming in an effort to control the disease. It is believed that *Lippia javanica* contains high zinc content that fights against the virus, reduces viral replication, and boosts the human immune system. Other common trees include *Sclerocarya birrea* due to its high vitamin C content in fruit skin and *Moringa* (*Moringa oleifera*), an immune booster. Several people were using indigenous knowledge in fighting against Covid-19 with few in rural areas adopting the use of scientific methods. It can be concluded that indigenous knowledge system was highly adopted by people in fighting against Covid-19.

KEYWORDS

Indigenous knowledge, zumbani, *Lippia javanica*, Covid-19, commercialisation, *Moringa oleifera*

1. Introduction

Indigenous Knowledge Systems (IKS) refer to the thoughts and beliefs existing among local indigenous people (Eyong, 2007; Siambombe et al., 2018). This type of knowledge transcends from one generation to the next, including knowledge of indigenous plants, food preservation and disease control (Odero, 2011) among others. Several definitions of IKS are discussed in the literature. Milupi et al. (2017) and Senayake (2006) believe that IKS is comprehensive knowledge of a particular society and community. As a form of science, IKS has spearheaded the emergence of primary healthcare systems in most African countries (WHO, 2008). This role has encouraged continuity of life from one generation to the other in diverse cultural and societal spheres (Lima et al., 2017).

Sahai (2013) postulated that IKS dissemination of medicinal plants differs depending on the flora and agro-ecological regions. To this effect, Rifiati et al. (2018) advised that IKS have been side-lined, and ignored, in the education curriculum, hence modern communities failing to fully acknowledge its contribution to orthodox scientific knowledge. Therefore, Moyo and Kizito (2014) recommended an integrative approach to merge IKS into the science curriculum for schools.

The majority of African populations have poor access to basic healthcare facilities, services let alone modern medicines. In cases where they are available, the same are expensive to most citizens. As such, IKS has been alluded to as an alternative even during periods of pandemics. However, use of IKS in Covid-19 knowledge and management practices is limited due to the lack of commercialisation in Zimbabwe among other reasons.

Commercialisation refers to availing existing traditional knowledge to a large society in order for the knowledge to be global to people and markets. The use of IKS as primary healthcare in providing native remedies in response to diseases has been appreciated before the eruption of the current Covid-19 pandemic (WHO, 2000). This observation prophesies the need for traditional remedies to combat the infectious diseases currently being faced worldwide. William (2013) postulated a need to obtain consent to commercialise IKS from indigenous communities. In Southern African countries, for instance, Muzah (2016) noted an intrinsic relationship between IKS and Mupfura/Amarula (*Sclerocarya birrea*).

The *Sclerocarya birrea* tree, otherwise the Amarula tree, has been referred to as the 'tree of life' because it provides important human needs (food and medicine) (Maroyi, 2013). Maroyi further notes that its barks, leaves, and roots, cure sore eyes, diarrhoea, and influenza. It can, therefore, be possible to use existing Indigenous knowledge to explore how the same barks can be used as a remedy to Covid-19 pandemic. This discovery will subsequently be of help in an African context and will gradually be accepted by Western countries. Hence, the commercialisation of IKS in Zimbabwe and beyond is a pre-requisite, and can be done through protocols such as copyrights agreements, open access and collective sharing of realised profits by indigenous communities. This method has an advantage of preventing fraud by bio-prospectors when they make profits while sidelining indigenous communities. William (2013) highlighted the need to commercialise IKS in South Africa by acknowledging the indigenous people and communities as stewards of the existing traditional knowledge. It also entailed the promotion of a more comprehensive global base-application-enhancing-research, and development, through collective consciousness.

Maunganidze (2016) supported the need to formulate indigenous rights for different communities as an agenda in the United Nations (UN). This plan was hoped to be key in safeguarding IKS from grabbers who may not acknowledge the source of

knowledge. The UN Draft Declaration (2018) spells out the right to revitalise, develop and transmit histories, philosophies and other intellectual pursuits to upcoming generations. Furthermore, Maunganidze (2016) declared that Article 24 of the UN Draft Declaration (2018) provides the right to “indigenous medicines and health practices” by way of preserving “vital medicinal wildlife and minerals.”

Due to economic hardships in Zimbabwe, modern drugs are now out of reach for many poverty-stricken households resulting in most families sorely depending on traditional medicines for their health remedy needs. The risk of infection, and death, from Covid-19 was exacerbated by severe food shortages, perennial job action by medical personal due to poor wages and lack of personal protective equipment. These factors, among others, contributed to a dramatic rise in the Covid-19 spread, and high fatality rate in the country.

In the past, communities using IKS, were able to manage and survive pandemics that bedevilled livelihoods at the time. Traditionally, collective effort was used, coupled by support received from traditional leaders and spirit mediums. Thus, IKS were used to cure diseases using medicinal plants, taken for granted by the current generation in most communities.

Against the aforesaid, there is need to document traditional knowledge entrenched in Zimbabwean societies' socio-cultural and economic fabrics. Maroyi (2013) indicated that IKS are not well documented in Zimbabwe. Documentation of IKS in the use of traditional medicines ensures preservation, conservation and sustainable use of the flora and fauna in managing as well as controlling pandemics.

The exploitation of IKS by capitalists, while side-lining people who are the owners of such knowledge; assisting scientists to share the traditional healing and curing science from medicinal plants remedies to combat diseases, calls for a review to document existing IKS for commercialisation in Zimbabwe.

2. Indigenous knowledge and the control coronavirus

Several IK methods were used to help control the coronavirus. The most popular methods included steaming water, *Zumbani* (*Lippia Javanica*) salt solution and concoctions from a mixture of several tree parts. Leaves and stems of *Lippia Javanica* are also sold as herbal medicines in the medicinal plant “*muthi*” markets in South Africa (Moeng, 2014). Traditionally, *Lippia Javanica* is commonly used to treat fever and malaria and repel insects throughout its distributional range (Maroyi & Mosina, 2014). The same *Lippia Javanica* is, therefore, being used in Zimbabwe by steaming three to four times per day as it is believed that the shrub contains zinc which fights against viruses (Mfengu et al., 2021; Verma et al., 2020; Vroh, 2020). In some cases, dry leaves of *Lippia Javanica* were noted as being used as tea leaves and consumed as such.

This method is still considered more effective in controlling SARS-CoV and coronavirus by many people worldwide (Benarba & Pandiella, 2020), although scientific investigations are still underway. In Madagascar, a combination of Artemisia, ginger, garlic, paw-paw leaves, Neem leaves, oranges, and lime, have been used to fight against the Covid-19 pandemic. These were mixed and boiled for approximately 30 minutes; were used for steaming and inhaling to fight against the virus. In Zimbabwe, *Zumbani* (*Lippia Javanica*) is boiled for at least 15 minutes, and is either steam-inhaled or consumed orally as Covid-19 organics. The use of steaming and steam inhalation clears the virus in the throat and lungs, dealing with any difficulties in breathing.

Orisakwea et al. (2020) reported that researchers in Madagascar used mixed remedies to fight Covid-19 through oral drinking. This method was similarly reported

in countries such as Nigeria, Cameroon, and Zimbabwe, where people mixed various indigenous tree leaves, roots, flowers, and twigs to fight the coronavirus (Fokou et al., 2020; Orisakwea et al., 2020; Bhebhe & Rukuni, 2021).

The Coronavirus was first regarded as a lung disease, but it was later discovered that it affects the whole body, as such, and for most African communities, needs the IK remedies given that they quickly move to all body parts (Orisakwea et al., 2020). Most of the used IK remedies, contain phenolic compounds, antioxidants and bioflavonoids, which are antiviral and improve the immune system. IK remedies in Africa, and across the globe, may be a potential option to control the coronavirus.

It was noted that most people prepare different drinking recipes such as mixing onion (*Alium Cepa*) with lemon and orange juice for drinking (Fokou et al., 2020). *Alium Cepa* can be placed on a pillow during the night to freshen breathing air and open airwaves.

The same concept can also be applied in stages to Covid-19 patients with breathing challenges. The mixing of *Alium Cepa* with *Lippia javanica* and eucalyptus oil was commonly done during the night for steaming. This was reported as improving breathing, and removing mucus from the lungs. For some, daily drinking of warm water solution was done to create a harsh environment in the body in order to halt the replication of the virus. In Cameroon, most people were reported as undertaking steaming, eating garlic, onions, Moringa leaves, and Mango (*Mangifera indica*) leaves in porridge, and tea, to fight the coronavirus (Fokou et al., 2020). In Zimbabwe, peppermint, garlic, water, and honey were commonly used daily to fight the coronavirus infections (Bhebhe & Rukuni, 2020). Both the infected and uninfected people used the remedies as means of controlling the spread of the virus. Most of the remedies used contain secondary metabolites such as bioflavonoids, steroids, polyphenols, antioxidants and terpenoids, which are all antiviral, and can reduce viral power, replication and minimise the spread of the virus (Kwape et al., 2016; Khanna et al., 2020). Flavonoids were effective in controlling SARS-CoV (Yu et al., 2012) and thus can also be used in controlling coronavirus. This fact was supported by Khanna et al. (2020) and Adem et al. (2020), who reported that polyphenols and flavonoids are essential and effective in controlling coronavirus

3. Effectiveness of indigenous knowledge in controlling the coronavirus

The covid-19 pandemic affected many countries' health systems, and became a significant threat to human security compared to other diseases such as the deadly diseases notably HIV/AIDS, cancer, and diabetes. African governments need to adopt innovative management of the health systems through the inception of IK and herbal medicines to fight the covid-19 (Olawale & Olaopa, 2019). Indigenous knowledge (IK) is traditional or local knowledge, an in the area of medicine and healthcare, is used to treat many diseases and ailments inherited from previous generations in human societies without any proper evidence of the effectiveness of the ideas (Mafongoya & Ajayi, 2017). Control of coronavirus infections in 2019 outbreaks lacked effective vaccines or drugs as such calling for appropriate interventions. Indigenous knowledge has been a source of medicinal agents for thousands of years, as such could help circumvent the threat of covid-19 (Fokou & Ducos, 2020).

Although IK faced criticism at first, with most doctors and health authorities disregarding the use of IK remedies, the idea gained popularity because most people had seen its effectiveness in the treatment of other diseases such as cancer, and sexually transmitted infections (STIs) (Green, 2012; Ellen & Harris, 2020). The effectiveness of IK remedies in treating other diseases made it well accepted by many people in the treatment of coronavirus, and the high rate of recoveries from the coronavirus suggested that IK remedies were effective in fighting the coronavirus. The western and orthodox scientific means appeared to have failed to produce

sustainable ideas in controlling the coronavirus as it has taken long to develop a vaccine.

The vaccines also fail to show effectiveness as populations continue to be infected, and rely on IK remedies to boost their immunity, and find life again. The Indigenous knowledge system is a local idea rooted in a particular place and can be borrowed to other places by many people but can only be understood by its effectiveness by people in the area it was developed (Ellen & Harris, 2020). The use of IK is thus of paramount importance in the control of the coronavirus; it is much more effective than using modern medicines which regard viral diseases as incurable.

IK has thus been used to cure viral infections, a good example being use of the *Lippia javanica*, and Neem leaves to control coronavirus in Zimbabwe and Madagascar (Bhebhe & Rukuni, 2021; Khan, 2021) respectively. The use of orthodox scientific ideas need not be side-lined because there is need to have them integrated with IK, or vice versa to improve its effectiveness. Table 1 compares formal methods and IKS.

Features of formal science and IKS

Table 1: A comparative of formal science and IKS

Major differences	Western/formal science	IKS
Mode of transmission	Written, formally documented	Oral, repetitive
Substantive differences	To construct general explanations; is removed from people's daily lives	Concerned with immediate and concrete necessities of people's daily livelihoods
Methodological and epistemological differences	It is open, systematic, objective and analytical. It advances by building rigorously on prior Achievements	It is closed, non-systematic and holistic rather than analytical. It advances based on new experiences, not based on deductive logic
Contextual differences	It is divorced from an epistemic framework in search of universal validity	It exists in a local context anchored to a particular social group, in a particular setting at a particular time

(Adapted from Mafongoya and Ajayi, 2017).

4. Integration of IKS and modern medicines: The proposed integration framework

Integration of IKS and modern medicines can be a good move for most rural people who are resource poor and not able to raise funds to buy full package of modern-day medicines. IKS medicines contain various chemicals which play a major role in fighting against covid-19 virus. A good example is the use of *Zumbani* which contain zinc and vitamin C which are major micro-nutrients to fight against viruses. Taking up tablets like Azithromycin and integrate with *Zumbani* may speed up fight against the virus reducing days to recovery. Production of IKS medicines may also create better opportunities for rural people and researchers leading to intellectual property right, hence creating employment. Figure 1 below demonstrates the theoretical concept for effective indigenous knowledge in controlling covid-19.

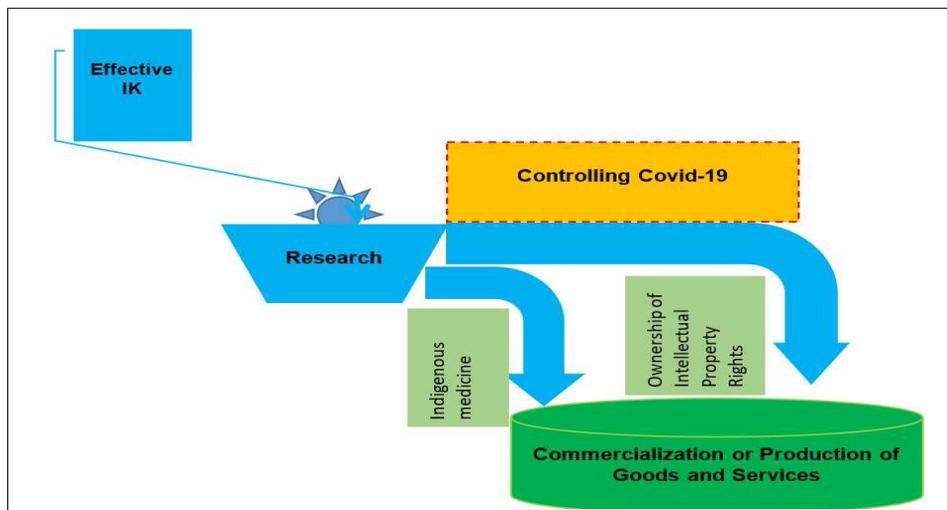


Figure 1: Theoretical concept for effective indigenous knowledge to control covid-19

The future of the effective use of IK is driven by research which will subsequently generate solutions in controlling covid-19 in the form of indigenous medicine and ownership of intellectual property rights which can be eventually commercialised.

5. IKS success cases and unfinished business

The success of some African home remedies and treatment for covid-19 has not been proved and documented scientifically. However, their utility cannot be questioned without scientific evidence. Nee and pawpaw leaves, ginger, garlic, moringa, lemon grass and marula tree have been widely used in Africa and globally in the management of covid-19.

5.1 Nee Leave

Studies have demonstrated a reduced risk of covid-19 infection in participants receiving neem capsules, which demonstrates its potential as a prophylactic treatment for the prevention of covid-19 infection (Nesari et al., 2021). However, the findings warrant further investigation in clinical trials.

5.2 Pawpaw leaves

Pawpaw Leaves Extract (PLE) has been proposed as a complementary alternative medicine to combat the hyper coagulation related to venous and arterial thrombotic complications and to restore platelet level after a thrombocytopenic event commonly seen in severe covid-19 patients (Shukor & Shukor, 2020).

5.3 Garlic and ginger

Ginger is a flowering plant whose rhizome, ginger root or ginger, is widely used as a spice. Garlic is a plant in the Allium (onion) family (Orish, Orisakwe, Chinna, Eudora and Nwanaforod, 2020). These leaves and roots of plant materials therefore have been used as aqueous decoctions were the acclaimed anti-covid-19 remedies with notable antioxidant and anti-inflammatory properties were found to be beneficial.

Figure 2 shows how Neem can collaborate with other plants to fight against coronavirus in Madagascar. The effectiveness of Neem has been proved and has been adopted by many people in Madagascar and in other countries.



Figure 2: Use of Neem in Madagascar

Table 2 illustrates different indigenous medicine and their use, with the Neem plants found in Madagascar. Chinese drugs were discovered in Cuba, and are claimed to have treated covid-19. Moringa tree is considered to fight against diseases like HIV/AIDS and coronavirus and found in most African countries.

Table 2: Indigenous Knowledge & Medicines

Indigenous Medicine	Use
The Neem	Leaves of the Neem plant were mixed with other plants to produce a remedy that people consume orally to fight Covid-19 in Madagascar.
China Drugs	Discovered in Cuba, the drugs were successfully used to treat Covid-19 where treatment of the dengue virus was witnessed.
The Neem tree (<i>Azadirachta indica</i>)	Leaves of the tree were mixed with other plants, boiled, and people drank to treat malaria and many diseases. The same concept was used to treat around 40 diseases in Kenya. Roots were also boiled and used to fight against coronavirus.
Charcoal	Added in water and left for a few hours. Water collected can be used orally to cure diseases in animals, especially poultry and in humans. People drink water, and it is believed that it fights against the virus, although there is no scientific evidence to prove it.
Lemongrass and pawpaw leaves	People mix lemon juice, pulp and fruit skin with pawpaw leaves and boil. The concoction is taken orally, and it has been reported to cure the influenza virus, and many people use it to fight against coronavirus.
Moringa tree	<i>Moringa oleifera</i> contain high protein content, which people believe boosts the immune system through enzyme production, which hydrolyses toxic substances (Nwonwu, 2020). People use bark, leaves and flowers, and pods to add water, porridge, and tea, orally fighting against diseases like HIV/AIDS and coronavirus.
The Marula tree (<i>Sclerocarya birrea subsp Caffra</i>)	The tree fruit skin contains high vitamin C content, which is used to fight against coronavirus as it is antiviral. Humans' consumption of dried fruit skin of the tree boosts the immune system and fights against coronavirus. Some people crush dried fruit skins and use them as soda, porridge supplements to fight against coronavirus.

To improve the use of IK remedies and their effectiveness, African governments need to fund the commercialisation of IK in most of these countries as well as

improve their use. These remedies can be used to produce tablets that are effective against the virus. Still, there is a need to do laboratory experiments to develop quantities of antioxidants, bioflavonoids, phenolic compounds, zinc and vitamin C in these remedies. It can only be done by legalising IK remedies, funding and research (Thomford et al., 2018; Dzobo & Chirikure, 2021). Research in IKS can be central in advancing the effectiveness of IK remedies and medicines used in controlling coronavirus.

6. The link between IK and Scientific methods in controlling coronavirus

There is need for 'integrative' medicines in the treatment and control of covid-19, where indigenous and western 'science' are incorporated. Integration has been adopted to control diseases by some Asian countries such as China in their health systems (*Chinese Journal of Integrative Medicine*, 2011). It is undisputed that both indigenous and modern methods are vital in the management of covid-19. IKS and modern methods can be combined in the management of covid-19. Figure 3 demonstrates the potential of linking IKS and scientific methods in managing covid-19. Medicines identified by spirit mediums, diviners and herbalists can be subjected to laboratory tests in order to establish their efficacy. The drugs and vaccines can be distributed to end users through both traditional and modern channels such as herbalists and pharmacies. Integrating IK and scientific methods will help in containing covid-19 considering that the majority of African use traditional medicines.

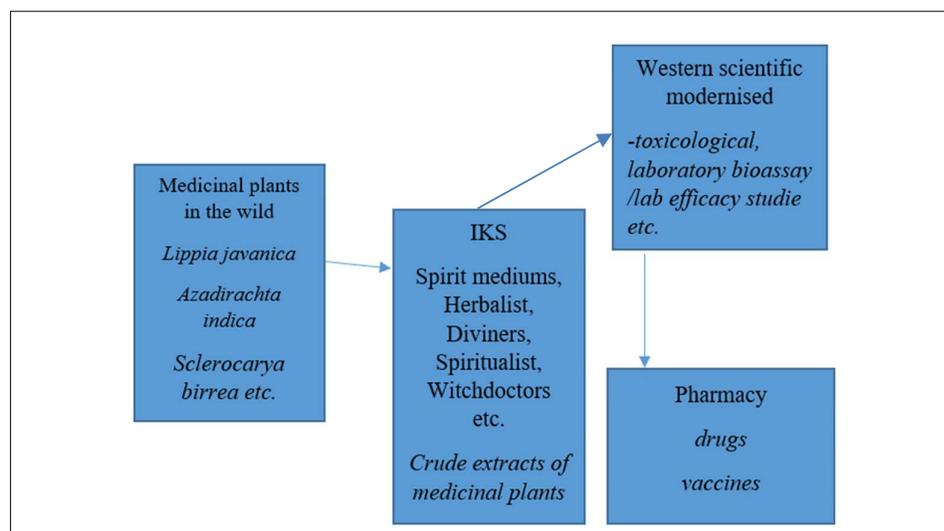


Figure 3: Model illustrating the complementary relationship between IKS and Modern Scientific Methods

It is important to establish the significance and efficacy of IK in treating and preventing covid-19. Considering the global shortages of covid-19 modern drugs and vaccines it becomes imperative to link IKS and scientific methods in the management of covid-19. Since covid-19 is novel with the clinical and epidemiological documentation of its characteristics currently going on (Guan et al., 2020) there is no better time than now to combine IK and modern science as the world tries to understand the virus. The challenges associated with covid-19 vaccines makes it clear that integrating IK and modern science is unavoidable.

7. Commercialisation of IKS

IK can be commercialised for agricultural and medicinal purposes, food and personal care products. Agricultural and pharmaceutical companies have used plants and animals IK to manufacture new drugs, crop species and various commercial products,

realising huge profits (RAFI, 1994). According to Posey (1996) the agricultural industry can harness indigenous folk crop varieties to provide wild germplasm which produces new crop varieties with enhanced productivity and resistance to diseases. The pharmaceutical industry can use indigenous medicinal knowledge in the development of new drugs and treatments. In addition, industries can manufacture food, industrial oils and personal care products based on IK and local resources.

However, the commercialisation of IK can be a better option if the parties involved make sound agreements. Indigenous knowledge in medicinal circles is linked with spirit mediums and other rituals done in different cultures. Due to these claims, the commercialisation of IK faces many problems since spirit mediums do not subscribe to modern medicinal and clinical practices. It makes commercialisation difficult, and many believe that mixing IK remedies is instructions given by spirit mediums. Many of the trees used in making IK medicines are searched and harvested by those qualified for such a task as they are believed to have been 'cleansed' by spirit mediums to create a proper link between the people, and the spirits.

Another problem is lack of scientific support, and resources required to commercialise the IK in medical circles. There is no supported link between IK and scientific knowledge. Absence of these links makes it difficult to convince people who are devoted to orthodox science to believe in IK. All these accessions are supported by the non-existence of legal, and constitutional protection of IKS and the lack of data bank of IKS in many countries. This challenge might be a severe deficiency for Zimbabwe. William (2013) identified this challenge as a databank that helps profile various IKS from various communities. This issue is of concern as the country is losing the aged group with IKS, who are succumbing to Covid-19. Hence, a library will prevent bio-prospectus from stealing present IKS in Zimbabwe.

There is also no proper documentation, legal and constitutional frameworks for Indigenous Knowledge systems towards commercial management of diseases in Zimbabwe. The Zimbabwean constitution has no single provision that recognises the existing IKS explicitly as compared to other African countries such as Kenya (The Kenyan Constitution, 2010 Article 69 (1)). Legal protection encourages IKS based innovation hence promoting commercialisation. In Zimbabwe, traditionalists are hesitant to share their knowledge and expertise in the treatment of covid-19. They are afraid of losing their knowledge to companies and scientists from technologically developed countries. Biopiracy which is the unauthorised commercialisation of IKS and genetic resources without the authorisation and benefit of indigenous populations has been on the increase globally (Swiderska, 2016)

8. Conclusion

Indigenous knowledge plays an important role in the control of coronavirus as much of the African populations rely on it. IK has been a traditional channel used by African forefathers to manage several diseases before people moved on to consult orthodox scientific ways.

The IKS system contributed immensely toward human livelihoods, control of diseases and brought life to many people. Several trees and plants have been used to control most diseases, especially incurable viral diseases; for example, *Lippia Javanica* was used many years ago to treat coughs and aching muscles.

Challenges of using IK is lack of data, attested instructions and quantities to be used according to ages and other health parameters. This paper has reported that use of IK has been reported to be effective in many countries for the control, and treatment of coronavirus. These notable African countries include Cameroon, Madagascar, Zimbabwe, Nigeria and Zambia. It was reported that most people used IK and they recovered quickly compared to those who were using the modern scientific methods only. As such most organisations have been proposing commercialisation of IK, but this has failed due to a lack of data and evidence on mixing traditional remedies. Lack of patents also affected the commercialisation of IK in most of the African countries among others across the world.

9. Recommendations

This study found IK to be a potential option in the management of covid-19. People can use IK in collaboration with scientific methods. Therefore, IK-based innovations must not be overlooked in the fight against covid-19 but must be integrated with modern scientific research and practices. IK may not be effective compared to standard and modern public health approaches but may certainly complement efforts in dealing with covid-19. Further research may help in understanding the potential of IK in the management of covid-19. Commercialisation can also be done, but there is a need to create patents rights so that those who come up with their remedies can get income from selling these remedies. There is also a need to establish legal frameworks at national and international level that can be the best in commercialising IKS and preventing biodiversity loss. Moreover, it is important to come up with national and international policies which promote the integration of IK and modern science in the fight against covid-19.

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