

1 **Reimagining China's transportation funding investments in Africa in lieu of COVID-19**

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10 Word Count: 5943 words

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13 *Submitted July 31, 2020 Seoul Time*

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1 **ABSTRACT**

2 Africa has not invested enough in its healthcare system and China has been investing in and
3 financing much of Africa’s transportation system. Many African countries’ fragile health and
4 transportation systems are further weakened by the COVID-19 pandemic. This literature review
5 confirms the interdependence of the key functional areas of comprehensive development planning
6 and the importance of building and maintaining a sound transportation infrastructure. With respect
7 to its partnership with China, the African nation needs to enter into trade agreements from a more
8 comprehensive lens. The trade agreements and financing deals need to take into consideration all
9 of the functional areas of comprehensive development planning. It is all the more apparent given
10 the COVID-19 pandemic that these trade deals need to include simultaneous heavy investments in
11 healthcare, education, housing, public utilities (water and electricity), and economic development
12 through improved supply chain management and the use of advanced digital technology.

13 In addition to the deal structures for China’s investments in China’s transportation infrastructure,
14 there are also opportunities to reimagine the African nations’ internal transportation spending. For
15 example, there are models in the United States for using transportation funds to invest in health
16 clinics in transit stations. The COVID-19 pandemic has brought this issue to bear and it is a
17 problem that can be rectified with ‘comprehensive’ development planning that takes into account
18 all of the key functional areas of planning: healthcare, environmental protection, safety, education,
19 housing, economic development and transportation. Five recommendations follow the literature
20 review and discussion.

21 **Keywords:** transportation planning, comprehensive development planning, China investment in Africa

1 INTRODUCTION

2 Comprehensive functional areas planning has been used by states in the USA since the 1920s. The
3 functional areas include planning for land use, zoning, housing, education, safety, economic
4 development, environmental protection and transportation (1). Events during the COVID-19
5 pandemic provide evidence that the functional areas of urban and rural comprehensive
6 development and planning are interdependent. Poorer economies are home to society's most
7 vulnerable and they will be hit hardest by the COVID-19 pandemic (2). While the direct impact is
8 on health, the indirect impacts are largely economic in scope related to poverty, inequality and
9 food security. These areas are devastated by the stay at home orders, social distancing and travel
10 restrictions (3). In particular, healthcare and economics are closely reliant on transportation. Africa
11 has not invested enough in its healthcare system and China has been investing in and financing
12 much of Africa's transportation system.

13 The African continent has the fastest growing population and receives the least in Foreign Direct
14 Investment (FDI) than any other emerging region except the Central-Asian transition economies
15 (4). By 2050, Africa's 1.1-billion population is estimated to double. Per the IMF and World Bank,
16 Africa is the world's second fastest growing continent primarily due to growth in the Sub-Saharan
17 region (5-7). In addition, Africa is the fastest urbanizing region of the world (5). The University
18 of Navarra's IESE Cities in Motion Index (CIMI) of urban indicators ranks the top five (5) African
19 cities as Cape Town, South Africa; Johannesburg, South Africa; Tunis, Tunisia; Nairobi, Kenya;
20 and Casablanca, Morocco (8). Yet, as revealed in this literature review, well before the COVID-
21 19 outbreak, many countries and regions in Africa are not doing well in the strategic planning areas
22 of human capital, social cohesion, economy, governance, the environment, mobility and
23 transportation, urban planning, international projection and technology.

24 In a 2010 address to the Regional Committee for Africa, Dr. Margaret Chan, the Director General
25 of the World Health Organization stated that "progress in Africa towards ...health-related goals
26 have been perceptible, but slow". Dr. Chan was referring to self-reports from African countries
27 regarding the consequences of the 2008 financial crisis (9). According to the World Economic
28 Forum, African economies weathered the 2008 financial crisis well (10). Yet, the 2020 COVID-
29 19 pandemic has overwhelmed the healthcare facilities in advanced countries; and it is predicted
30 that the COVID-19 pandemic will devastate Africa's fragile health systems. There is a shortage of
31 ventilators and protective gear. Despite a 2001 pledge by the heads of states of 52 African countries
32 to commit to spending 15% of their annual Gross Domestic Product (GDP) on health, health care
33 funding has not been at the forefront of government spending in many African countries. The only
34 countries that met the target were Tanzania, Rwanda, Botswana and Zambia (11).

35 Besides the large healthcare infrastructure gap, Africa's transportation infrastructure is also
36 troublesome. For example, Susanne Neubert of the Centre for Rural Development in Berlin
37 advocated in 2016 that in Zambia, farmers need better transportation infrastructure and access to
38 vehicles to get their produce to market (12). In 2010, Dr. Chan stated "[y]ou need roads, not only
39 to transport goods to market. You need roads to extend health care to rural areas, to transport
40 people in need of emergency care and to deliver medicines and vaccines" (9). Current

1 transportation systems constrain the African continent's economic and social development (13;
2 14).

3 This literature review is followed by recommendations for international trade agreements that
4 better deal with Africa's growing population and growing needs. Rather than investing heavily in
5 transportation infrastructure, it is recommended herein that China invest simultaneously in
6 transportation, healthcare and educational functional areas of development planning. Further, there
7 is precedence for transportation funding to be used in other functional areas of planning. Policies
8 on how to make use of transportation funding need to be established from a more comprehensive
9 lens.

10 **LITERATURE REVIEW**

11 The method for this study is a literature review of Africa's needs in transportation and
12 interdependent functional areas of comprehensive development planning. Without roads and
13 railway lines, Africa's chances for economic growth and social prosperity remain poor. The
14 African continent could achieve economic diversity and industrialization with the building of
15 roads, railways and ports (15). To this end, in 2006, at a China-Africa summit in Beijing, Chinese
16 President Hu Jintao promised to provide additional funding for investment in Africa. In 2007, the
17 *China-Africa Development Fund* was established for a number of investments including the
18 expansion of transportation (13).

19 Cities that want to progress must secure a privileged place in the world by maintaining global
20 outreach to improve its brand. They can gain international recognition with representation abroad
21 (8). This was true of Beijing. When the Communist Party of China first came to power in 1949, it
22 was virtually completely unrecognized by other countries. China lobbied Africa extensively for
23 recognition. Political commitments were repaid in concrete and steel as China started building
24 railroads. In exchange, China is interested in African natural resources such as oil, cotton,
25 manganese to produce steel, cobalt and coltan for Chinese electronics. China is now Africa's
26 biggest trade partner with trade at \$200 billion per year (5).

27 China is building transportation infrastructure in 35 African countries; with a large concentration
28 in Angola, Nigeria and the Sudan. The largest deals have been in Nigeria, Gabon and Mauritania.
29 There is a commitment to build the Abuja Rail Mass Transit System and to rehab the Lagos-Kano
30 line in Nigeria (16). Projects include the \$12 billion coastal railway in Nigeria; \$4.5 billion Addis
31 Ababa-Djibouti railway in Ethiopia; and \$11 billion Megaport in Bagamoyo (5).

32 In the Sudan, China's Sinohydro Corporation was granted a \$300 million contract to construct
33 roads. In the Democratic Republic of Congo, the Export-Import Bank of China pledged a \$9 billion
34 loan to finance a rail system to connect mineral extraction industries and to develop the mining
35 sector. In return, China would gain rights to extract up to 10 million tons of copper and 420,000
36 tons of cobalt. In Guinea, China needed aluminum and offered assistance with both roads and
37 hospitals (16). According to the China Africa Research Institute, by 2018, the gross annual
38 revenues from Chinese engineering and construction projects in Africa totaled \$48.84 billion (17).
39 Chinese investment in infrastructure is filling the large gap and answers the unmet transportation
40 needs of African countries (13).

1 However, in 2015, there were substantial commodity price crashes. In response, Uganda
2 suspended construction of new roads. Herbert McCleod, a leading Sierra Leone economist, has
3 stated that problems with commodity price crashes in copper and iron are due to bad policies and
4 management. He recommends using proceeds from mining to boost job creation and to construct
5 roads (18). In 2015, African leaders took part in the Sixth Tokyo International Conference on
6 Africa's Development (TICAD VI) in Kenya. The first priority for Africa's development was to
7 achieve economic diversification and industrialization by investing in part in roads as a first
8 priority. The second priority was to build a more resilient health care system. The healthcare
9 urgency was made apparent with the 2014 Ebola virus outbreak. Guinea, Liberia and Sierra Leone
10 were unable to respond well to the Ebola epidemic. The third priority was to combat socio-
11 economic instability and climate change with job creation and disaster risk management (19).

12 Thirty (30) years ago, China was in a similar place that Africa is currently in with regard to Africa's
13 inadequate systems. In 2018, Beijing announced a \$60 billion African aid package. In October
14 2019, Beijing announced a \$1 Billion *Belt and Road Africa Infrastructure Development Fund* (5).
15 Nevertheless, there is a lot of focus on China's landmark Merger & Acquisitions (M&A) deals in
16 Africa's energy and metals industries. These are strategic objectives of China to secure access to
17 resources using China's capacity in construction and transportation. But, the debt financing is the
18 real concern (4). There's concern that the China debt financing has a self-interested nature focused
19 on extractions of Africa's natural resources; and there are concerns about the consequences of
20 increasing indebtedness of African economies to China (15). Actual investment in China is much
21 smaller than the debt generating project financing. The investments are much smaller than the
22 colonizing European countries' historical investments in Africa (4). Debt Problems include the
23 fact that the \$4.5 billion Addis Ababa–Djibouti railway in Ethiopia ended up costing Ethiopia
24 nearly a quarter of its's total 2016 budget; and Kenya's Mombasa-Nairobi railway has gone over
25 budget 4 times and costed Kenya 6% of its GDP. In 2012, the International Monetary Fund (IMF)
26 found that China owned 15% of Africa's external debt (5).

27 Further, one consequence of the COVID-19 pandemic is that Africa is experiencing a reduction in
28 demand for their commodities. "The COVID pandemic began to impact African economies ...
29 well before it reached the shores of the continent. Among the factors were: falling demand from
30 Africa's commodities; capital flight from Africa; a virtual collapse of tourism and air transport
31 ..lockdowns and border closures" (20). COVID-19 is taking a toll on Africa's economy.

32 In addition, hundreds of millions of Africans lack access to healthcare and clean water for frequent
33 handwashing and cleaning (21; 22). In Africa, as the number of COVID-19 infections grows, there
34 is nothing simple about washing your hands when you have extremely limited access to clean
35 water. The problem is not just a problem for Africa. In 2019, WHO reported that 785 million
36 people lack basic drinking water service worldwide. A right to access water requires substantial
37 investments in transportation and water treatment plant infrastructure (23). The UN Global
38 Humanitarian Response Plan (GHRP) supports the installation of handwashing facilities in
39 vulnerable places (24).

40 Non-containment of the virus poses a high risk to lower-income communities who rely on public
41 transportation; do not have savings and must continue to work; cannot afford hygiene products;

1 and live in large households or reside in informal settlements. One of the priority policy actions is
2 to provide emergency relief for emergency food distribution and transportation (25). There is also
3 a need for a concerted action for the world to come together during the COVID-19 crisis and assist
4 with debt relief in the form of freezes and relaxed debt servicing (26).

5 In April of 2020, the World Bank Group recommended that countries in Africa should strive to
6 maintain and expedite trade flows to secure access to medical goods, medical services, and food.
7 They recommended that transportation and logistics services be supported in order to maintain
8 cross-border and international value chains. In particular, maintenance along main trade corridors
9 and ports was deemed essential in light of the fact that Africa has the highest number of landlocked
10 countries in the world. These areas required continued access via both their regional and to global
11 economy (27). Acquiring adequate transportation capable of emergency response is listed as a
12 challenge in the Republic of Malawi's National COVID-19 Preparedness and Response Plan.
13 Additionally, lack of related capacity for human, technical, material and financial coordination is
14 problematic. The Republic of Malawi recognizes how global disruptions such as border closures
15 and travel restrictions in the medical and humanitarian supply chain leads to transportation delays
16 (28). In Africa, there is generally inefficient and bureaucratic public sector supply systems and
17 poor transportation systems (29).

18 "Lockdowns, curfews and reduced manpower due to physical distancing are impacting all stages
19 of the supply chain from production and manufacturing ... to road and air transport" (24).
20 Transportation restrictions include border closures and cargo movement limitations. The provision
21 of essential personal protective equipment has been a challenge due to supply chain obstacles.
22 "Insufficient funding severely limits the ability to plan for and negotiate contracts, and to roll out
23 logistics services at the scale required to ensure the supply chain needs and timely transportation
24 of critical cargo for the global response" (24). The World Food Programme (WFP) supply chain
25 services directly serve the non-government organization (NGO) community that functions
26 independent of government services. This community faces increasing restrictions that inhibit their
27 ability to mobilize, position and transport supplies and staff due to the curtailment of commercial
28 transportation and cargo services (24). To achieve a reliable health and supply system, it is
29 imperative that the system have the capability to forecast needs, procure, store, transport and
30 inventory medicines and medical devices (30; 31).

31 During the West Africa Ebola response, approximately half of the volume of cargo transported
32 was on behalf of UN Partners. In April of 2020, a consortium of NGOs warned that without the
33 supply chain services laid out in the GHRP, NGOs will be forced to halt operations and pull out
34 of critical response locations. The *United Nations International Children's Emergency Fund*
35 (UNICEF) works with the UN to improve the lives of children and their families. In support of the
36 UNICEF and partners, COVID-19 support includes shared procurement services for specialized
37 supplies (24).

38 Good health requires good diets. Good diets require food. Food insecurity is a real concern in
39 Africa. In East Africa, the pandemic strikes at a time when the region is fighting an ongoing locust
40 outbreak and is recovering from the year's 2019 drought and floods. Food insecurity is alarmingly
41 high, with more than 15 million people in the Integrated Food Security Phase classification 'IPC

1 *phase 3*’ or above in Ethiopia, South Sudan, Somalia and Kenya. IPC phase 3 is the crisis phase
2 (24; 32). COVID-19 has resulted in slower global trade and a slow-down in the demand for and
3 transportation of exports from Africa. Transportation for key imports is also an issue at ports and
4 along transportation corridors. The African Union estimates that 20 million jobs are at risk. Labor
5 shortages and transportation mobility issues disrupt the agri-food supply chains and increase food
6 insecurity (33).

7 Many Africans risk becoming food insecure as a consequence of this crisis. It is important to
8 prioritize agriculture by declaring it a critical sector that should not be interrupted by COVID-19
9 related measures. Farmers need support and food corridors need to be secured to ensure
10 uninterrupted supplies and food security (20). Two (2) recommendations for food security include:
11 (1) designating the agriculture sector an essential economic activity that must continue regardless
12 of pandemic related emergency restrictions; and (2) establishing and protecting food supply
13 corridors for transportation especially in land locked and island states. Solutions for food security
14 require investments in transportation systems to boost production, reduce post-harvest losses and
15 volatility in the supply and price of food (20).

16 Further, it is recommended that no additional taxes and fees are imposed on transit traffic and that
17 existing duties be reduced on medical supplies and food (27). Besides taxes, the pricing of medical
18 services is also a concern. It has been argued that ‘healthcare is a human right’ (34; 35). In South
19 Africa, the government has enacted regulations that all for setting maximum prices on private
20 medical services related to COVID-19 testing and treatment (34). Besides the pricing of medical
21 services, the Republic of Malawi is concerned about increases in transportation fares related to
22 emergency responses (28).

23 Another fiscal issue is the likelihood of increased prices on imports due to the disruption in the
24 global supply chain. For example, in Kenya, the Port of Mombasa was significantly affected by
25 the cancellation of 37 ships in March 2020 due to COVID-19. Kenya imports 21% of its goods
26 from China. Low supply of imports is predicted to result in increased prices on clothing, furniture
27 and electronics. In addition to logistics issues (related to transportation restrictions, stricter border
28 checks, and quarantines of cargo shipping crews), some countries have restricted food exports
29 (36).

30 With respect to healthcare, cross-border truck drivers are a high-risk COVID-19 carrier population
31 (33). ‘Container clinics’ along Africa’s transportation corridors were recommended by the World
32 Bank Group. A lesson from the HIV/AIDS epidemic in Africa was that the disease spread along
33 main transportation corridors. The establishment of ‘container clinics’ by the Abidjan-Lagos
34 Corridor Organization (ALCO) in West Africa proved to be helpful (27).

35 While income inequality between countries decreased since 1980, the benefits of economic growth
36 has not been evenly distributed (37). Sub-Saharan Africa has fallen behind (3). They are woefully
37 behind in health care services such as family planning and infant immunization (38). Further,
38 without access to medicines, the African continent has suffered through the HIV/AIDS epidemic,
39 tuberculosis, and malaria. Fifty percent (50%) of children under five who die of pneumonia,

1 diarrhea, measles, malaria, tuberculosis and HIV/AIDS are in Africa (29). There are also other
2 chronic diseases such as diabetes, heart disease and sickle cell anemia.

3 In 2020, Vadlamannati et al. tested two (2) hypotheses: (1) whether equality in access to health
4 care reduces the societal impact of health pandemics; and (2) whether health care equity should
5 matter more than broad-egalitarian governance for reducing the harmful consequences of
6 pandemics. Increased access to healthcare and stringent lockdown measures increases testing and
7 decreases deaths. COVID-19 deaths decreased with increases in health care equity. Based on their
8 findings, they recommend that governments pay more attention to ways that they can fight the
9 spread of disease by expanding their health system capabilities (39). Given their findings, it would
10 make sense to invest in health care before or alongside hefty investments in transportation
11 infrastructure. The focus should never be shifted away from healthcare.

12 Further, only half of the population of Sub-Saharan Africa has access to electricity. In addition,
13 over the past 20 years, road density in the region has declined. The digitalization of African
14 economies can improve transportation systems (25). With regard to healthcare, for example,
15 Malawi uses mobile phones' digital technology to combat maternal deaths (40).

16 With respect to supply chains for healthcare and food, the Cote d'Ivoire government adopted an
17 emergency response plan that includes supporting public entities in the transportation and port
18 sectors to ensure continuity in supply chains (25). There are a number of AI applications addressing
19 COVID-19 in use. However, to achieve a global impact, "large-scale data and model sharing,
20 operational validation, and adaptation to local contexts are needed". There is a need for more
21 solidarity and cooperation and solidarity across borders and involvement of healthcare workers
22 (41).

23 Patrice Matchaba, Head of Global Health and Corporate Responsibility at Novartis, advocates that
24 digital healthcare technology from data analytics to artificial intelligence (AI) can bridge the
25 healthcare gap. For example, AI robotic drones can help tackle supply chain challenges (42). Firms
26 are piloting the use of drones to deliver medications and medical supplies in remote areas of Africa
27 (43). In Rwanda, where most of the population live in cutoff villages, the government wants to
28 skip straight to the use of drones to drop off blood to blood banks. Malawi is working with a British
29 architectural firm to plan drone ports for the use of drone transportation that deliver HIV blood
30 tests. However, there are skeptics that do not believe that these villages can leapfrog into relying
31 on high tech startups supported by Silicon Valley firms like Zipline in the USA when they lack
32 other important basic technologies. The concern is that issues with taxation, engineering,
33 fragmented markets and dysfunctional basic infrastructure will thwart progress with the
34 implementation of drones (44).

35 In addition, the public health facilities in South Africa are overcrowded which increases chances
36 of COVID-19 transmission (34; 35). During the 2014-2016 Ebola outbreak in West Africa, one
37 tragic consequence of attempts to control the spread of the virus was that pregnant women were
38 reluctant to seek maternity care in medical facilities due to fears of being exposed to the virus. It
39 is estimated that with COVID-19, the same reluctance to get health care will result in 1.2 million
40 child deaths and 56,700 maternal deaths (45). The London School of Hygiene and Tropical

1 Medicine (LSHTM) weighed the benefits of continued routine infant immunization vaccination
2 programs against the risk of infections in Africa. In its modeling, the LSHTM found that for each
3 COVID-19 death, at least 34 and as many as 1,247 future deaths would occur from a range of
4 diseases including measles, yellow fever and polio(24). Further, Jacaranda Maternity provides
5 pregnant patients with specially licensed cab drivers that transport patients in need of care to the
6 Jacaranda Maternity Hospital free of charge. In the Equatorial region of Southern Sudan, pregnant
7 women could not access healthcare in time because of poor road conditions. They now have
8 ambulances and roads with the help of the World Food Programme supported by the Dutch
9 government (45; 46).

10 Camels provide a novel system for transporting medical supplies and personnel in Kenya's remote
11 villages and underserved communities. Camel clinics are a Communities Health Africa Trust
12 (CHAT) initiative. Camel clinics are comprised of a team of 7 to 10 camels, a team of medical
13 workers and camel handlers. Uganda uses motorcycles to bring health care to remote areas. "In
14 Samburu, like other areas in northern Kenya that are inaccessible due to nearly impassible roads,
15 locals are forced to walk for hours to obtain urgent medical care. This has made the camel mobile
16 clinics the most convenient means of providing health services". In Kenya's county of Turkana,
17 motorcycle ambulances are in use. Motorcycles are used because they can navigate impassible
18 roads to save lives, carry medicine, and help women who are in labor (40). In response to COVID-
19 19, the UN Global Humanitarian Response Plan (GHRP) supports the creation of new
20 transportation hubs that facilitate the transportation of supplies by air travel. Medical supplies
21 manufactured in Liege, Dubai and China are being linked to regional hubs in Ethiopia, Ghana and
22 South Africa (24).

23 Upon reflection on these present-day conditions, we wonder 'what comes first, the chicken or the
24 egg'? In other words, what should be invested in first: roads or healthcare facilities? The China
25 model worked well for China. Their investments in physical capital improved their trade and
26 created jobs. The focus is on putting people to work first. Then, they invested more in human
27 capital including healthcare and educational systems (47). There's a Chinese proverb that "if you
28 want to prosper, first build roads' (15). Should healthcare facilities be built first before roads?
29 Should roads be invested in first as the China government advocates? Or should clinics be built
30 along roads as the roads are built?

31 Although China advocates for the building of transportation infrastructure in Africa, note that
32 health investments were a key part of China's development story (48). World Bank Group
33 President Dr. Jim Yong Kim has stated that "[i]nvestments in health, and more generally in people,
34 are critical to build human capital and enable sustainable and inclusive economic growth" (38). It
35 is necessary to simultaneously build a transportation infrastructure and other functional areas of
36 urban and rural planning such as healthcare, housing (i.e. with clean, running water), education
37 and environmental protection.

38 **DISCUSSION**

39 This literature review provides the foundation for the following recommendations for international
40 trade agreements that better deal with Africa's growing population and growing needs. Rather than

1 investing heavily in transportation infrastructure, it is far better to simultaneously invest in
2 transportation, healthcare and educational functional areas of development planning. Policies on
3 how to make use of transportation funding need to be established from a more comprehensive lens.

4 In the United States, there is precedence for transportation funding to be used in other functional
5 areas of planning. For example, there is precedence for using transportation funding in the US on
6 resources other than roads and bridges. The Intermodal Surface Transportation Efficiency Act of
7 1991 (ISTEA) created a new funding category called "Transportation Enhancement Activities"
8 (TEA) to fund environmental aesthetics activities such as scenic enhancement, new designs,
9 rehabilitation of historic transportation structures, 'rails to trails' conversions, bicycle and
10 pedestrian ways, and mitigation for billboard blight. The emphasis was on how transportation
11 funds could be used in more innovative ways to increase economic competition. By 1996, eight
12 percent (8%) of the \$50 billion Surface Transportation Program (STP) funds had to be used for
13 transportation enhancement activities (49).

14 With respect to healthcare, there has also been clinics built by local governments with federal
15 funding at public transit stations in the USA. For example, the City of St. Louis, Missouri received
16 \$940,000 from the US Department of Transportation (US DOT) in 2016 to provide health
17 checkups to commuters. The US DOT provided \$7.3 million in grants for non-emergency
18 healthcare to 19 communities (50). Similarly, in response to the need for COVID-19 virus testing,
19 the City of Montreal Canada transformed some of its city buses into mobile testing clinics (51).
20 Thus, there is precedence and models for simultaneously funding environmental enhancements
21 and transportation; and healthcare and transportation.

22 There are eight (8) functional areas of urban and rural comprehensive planning and development:
23 (1) healthcare, (2) education, (3) housing, (4) economics, (5) public safety, (6) environmental
24 protection, (7) transportation and (8) emergency management. See Figure 1. Transportation is at
25 the core of providing for the movement of people and goods that each of the other functional areas
26 of comprehensive planning and development depend on. Opportunities exist for governments to
27 act to simultaneously strengthen their healthcare systems, transportation systems and economies
28 while also improving their resilience to the impacts of environmental climate change.

29 Here are five (5) recommendations:

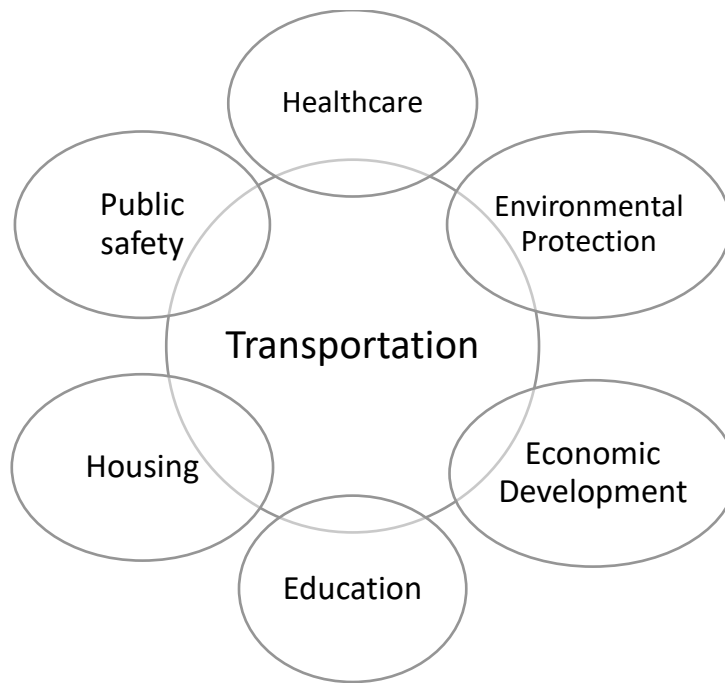
30 1. First, invest in cash for remote work as a social protection program.

31 Africa has vulnerable households. China and other well developed, advanced countries need to
32 invest substantially in containing the virus; assist vulnerable households by offering remote work;
33 and subsidize health care. The United Nations Food and Agriculture Organization has
34 recommended that African Union Member countries invest in expanding social protection
35 programs by leveraging humanitarian funding. Social protection is predictable, uninterrupted
36 social assistance benefits in the form of cash, work for cash, money for health expenses related to
37 testing and treatment, and access to food (52).

38 "African countries cannot afford to wait until the virus is contained before
39 implementing socio-economic support programmes... [workers] cannot comply

1 with social distancing and stay-at-home orders without severe consequences for
2 their lives and livelihoods. Many household earners would be forced to choose
3 between the virus and putting food on the table. Additionally, almost 90% of
4 women employed in Africa work in the informal sector, with no social protections.
5 Female headed households are particularly at risk” (20).

6 Remote work is a viable solution for African countries given their struggles with epidemics and
7 the COVID-19 pandemic. During the pandemic, Kenya’s government has encouraged teleworking
8 (36). Creating remote jobs for women and youth is an important step toward not over-taxing the
9 transportation system. Africans should be encouraged to work from home when possible.



10

11 **Figure 1 Eight (8) functional areas of urban and rural comprehensive planning and**
12 **development**

- 13 2. Invest heavily in population control using safe, protected sex education and birth control.
14
15 3. Build transportation systems that tackle climate change with the use of advanced
16 technology.

17 The Southern Africa region has been affected in the recent past by growing climate-related shocks
18 resulting in a record number of people being pushed into food insecurity (24). It is imperative to
19 build sustainable transportation systems that combat climate change. In developing regions
20 targeted for transportation infrastructure improvements, there is the opportunity to design
21 sustainable and inclusive transportation systems by default and make use of technology like
22 artificial intelligence and big data (53). Autonomous electric vehicles, autonomous air taxis, and
23 drones are worth investigating.

- 1 4. Have disaster risk management plans that include transportation planning and supply chain
2 management for the movement of goods and people.
- 3
- 4 5. Attempt to restructure existing infrastructure financing deals so that they address
5 development plans comprehensively and do not result in debt servicing that far outweighs
6 benefits of transportation infrastructure construction.

7

8 **CONCLUSIONS**

9 The African continent has the fastest growing populations. Africa has not invested enough in its
10 healthcare system and China has been investing in and financing much of Africa's transportation
11 system. Many African countries' fragile health and transportation systems are further weakened
12 by the COVID-19 pandemic. This literature review confirms the interdependence of the key
13 functional areas of comprehensive development planning and the importance of building and
14 maintaining a sound transportation infrastructure. With respect to its partnership with China, the
15 African nation needs to enter into trade agreements from a more comprehensive lens. The trade
16 agreements and financing deals need to take into consideration all of the functional areas of
17 comprehensive development planning. It is all the more apparent given the COVID-19 pandemic
18 that these trade deals need to include simultaneous heavy investments in healthcare, education,
19 housing, public utilities (water and electricity), and economic development through improved
20 supply chain management and the use of advanced digital technology.

21 In addition to the deal structures of China's investments in China's transportation infrastructure,
22 there are also opportunities to reimagine the African nations' internal transportation spending. For
23 example, there is precedence in the United States for using transportation funds in other areas of
24 comprehensive development planning. There is the Transportation Enhancement Act funding for
25 environmental beautification along transportation corridors. There has also been funding for health
26 clinics in transit stations. All too often strategic planners view transportation in a monolithic
27 manner rather than advocating for the use of the funds to meet community's needs
28 comprehensively. The COVID-19 pandemic has brought this issue to bear and it is a problem that
29 can be rectified with 'comprehensive' development planning that takes into account all of the key
30 functional areas of planning: healthcare, environmental protection, safety, education, housing,
31 economic development and transportation.

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