



Article

## Supplementary Materials

# COVID-19 Pandemic Related Research in Africa: Bibliometric Analysis of Scholarly Output, Collaborations and Scientific Leadership

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## 1. Supplementary Data S1

### 1.1. Search Terms:

#### 1.1.1. African Countries and Main Cities:

("Algeria" OR "Algerien" OR "Algerie" OR "Algiers" OR "Alger" OR "Angola" OR "Bangui" OR "Republique centrafricaine" OR "Central African Republic" OR "Benin" OR "Dahomey" OR "Benin" OR "Porto-Novo" OR "Botswana" OR "Kalahari" OR "Gaborone" OR "Burkina Faso" OR "Burkina" OR "Ouagadougou" OR "Banfora" OR "Bobo Dioulasso" OR "Burundi" OR "Bujumbura" OR "Gitega" OR "Cameroon" OR "Cameroun" OR "Yaounde" OR "Douala" OR "Bafoussam" OR "Bamenda" OR "Garoua" OR "Maroua" OR "Cape Verde" OR "Cabo Verde" OR "Praia" OR "Chad" OR "Tchad" OR "N'Djamena" OR "Tschad" OR "Comoros" OR "Comores" OR "Congo" OR "Republic of the Congo" OR "Kongo" OR "Brazzaville" OR "Cote d'Ivoire" OR "Ivory Coast" OR "Cote d'Ivoire" OR "Yamoussoukro" OR "Abidjan" OR "Bouake" OR "Korhogo" OR "Democratic Republic of the Congo" OR "Kinshasa" OR "Zaire" OR "Republique democratique du Congo" OR "Djibouti" OR "Egypt" OR "Malawi" OR "Cairo" OR "Al Minya" OR "Equatorial Guinea" OR "Guinee equatoriale" OR "Malabo" OR "Eritrea" OR "Asmara" OR "Ethiopia" OR "Ethiopie" OR "Addis Ababa" OR "Gabon" OR "Gabonese Republic" OR "Libreville" OR "Gambia" OR "Gambie" OR "Banjul" OR "Ghana" OR "Accra" OR "Takoradi" OR "Sekondi" OR "Koforidua" OR "Obuasi" OR "Kumasi" OR "Tamale" OR "Republic of Guinea" OR "Guinea" OR "Guinee" OR "Conakry" OR "Guinea-Bissau" OR "Guine-Bissau" OR "Bissau" OR "Kenya" OR "Kenia" OR "Nairobi" OR "Mombasa" OR "Lesotho" OR "Maseru" OR "Liberia" OR "Republic of Liberia" OR "Liberia" OR "Libya" OR "Libya" OR "Libye" OR "Libia" OR "Madagascar" OR "Madagaskar" OR "Madagasikara" OR "Antananarivo" OR "Toliara" OR "Fianarantsoa" OR "Antsirabe" OR "Toamasina" OR "Mahajanga" OR "Malawi" OR "Malawi" OR "Lilongwe" OR "Mali" OR "Bamako" OR "Sikasso" OR "Koutiala" OR "Koulikoro" OR "Segou" OR "Kayes" OR "Mopti" OR

"Mauritania" OR "Mauritanie" OR "Nouakchott" OR "Mauritius" OR "Ile Maurice" OR "Morocco" OR "Morocco" OR "Maroc" OR "Marruecos" OR "Rabat" OR "casablanca" OR "Mozambique" OR "Mosambik" OR "Mocambique" OR "Maputo" OR "Namibia" OR "Namibie" OR "Windhoek" OR "Niger" OR "Niamey" OR "Maradi" OR "Zinder" OR "Tillaberi" OR "Tahoua" OR "Agadez" OR "Nigeria" OR "Abuja" OR "Rwanda" OR "Ruanda" OR "Kigali" OR "Sao Tome" OR "Sao Tome" OR "Senegal" OR "Senegal" OR "Dakar" OR "Ziguinchor" OR "Seychelles" OR "Sierra Leone" OR "Somalia" OR "Somalie" OR "Mogadishu" OR "South Africa" OR "Afrique du Sud" OR "Pretoria" OR "Stellenbosch" OR "Cape Town" OR "Johannesburg" OR "South Sudan" OR "Sudsudan" OR "Juba" OR "Sudan" OR "Soudan" OR "Khartoum" OR "Swaziland" OR "eSwatini" OR "Mbabane" OR "Tanzania" OR "Zanzibar" OR "Tanganyika" OR "Tansania" OR "Tanzanie" OR "Dodoma" OR "Togo" OR "Lome" OR "Tunisia" OR "Tunesien" OR "Tunisie" OR "Tunis" OR "Gabes" OR "Uganda" OR "Ouganda" OR "Kampala" OR "Zambia" OR "Rhodesia" OR "Sambia" OR "Zambie" OR "Lusaka" OR "Zimbabwe" OR "Simbabwe" OR "Harare").

#### 1.1.2. Terms Related to COVID:

"sars cov 2" OR "covid" OR "COVID 19" OR "COVID 19" OR "ncov" OR "2019 ncov" OR "2019nCoV" OR "novel coronavirus" OR "COVID 19" OR "covid19" OR "covid" OR "new coronavirus" OR "new corona virus" OR "novel corona virus" OR ("Wuhan" AND ("coronavirus" OR "coronavirus" OR "coronaviruses")) OR "sars cov" OR "Coronavirus Disease" OR "SARS-Cov2" OR "Coronavirus 2" OR "2019 coronavirus" OR "coronavirus 2019" OR "Corona Virus Disease" OR "SARS coronavirus" OR "Coronavirus pandemic" OR "coronavirus outbreak\*" OR "china corona\*" OR "coronavirus" OR "coronaviruses" OR "corona virus".

## 1.2. Search Queries for Each Bibliographic Database:

## 1.2.1. WOS Search Query

#3	<p>#1 AND #2</p> <p>Databases = WOS, CCC, KJD, MEDLINE, RSCI, SCIELO Timespan = 2019–2021</p> <p>Search language = Auto</p>
#2	<p>AD = ("Algeria" OR "Algerien" OR "Algerie" OR "Algiers" OR "Alger" OR "Angola" OR "Bangui" OR "Republique centrafricaine" OR "Central African Republic" OR "Benin" OR "Dahomey" OR "Benin" OR "Porto-Novo" OR "Botswana" OR "Kalahari" OR "Gaborone" OR "Burkina Faso" OR "Burkina" OR "Ouagadougou" OR "Banfora" OR "Bobo Dioulasso" OR "Burundi" OR "Bujumbura" OR "Gitega" OR "Cameroon" OR "Cameroun" OR "Yaounde" OR "Douala" OR "Bafoussam" OR "Bamenda" OR "Garoua" OR "Maroua" OR "Cape Verde" OR "Cabo Verde" OR "Praia" OR "Chad" OR "Tchad" OR "N'Djamena" OR "Tschad" OR "Comoros" OR "Comores" OR "Congo" OR "Republic of the Congo" OR "Kongo" OR "Brazzaville" OR "Cote d'Ivoire" OR "Ivory Coast" OR "Cote d'Ivoire" OR "Yamoussoukro" OR "Abidjan" OR "Bouake" OR "Korhogo" OR "Democratic Republic of the Congo" OR "Kinshasa" OR "Zaire" OR "Republique democratique du Congo" OR "Djibouti" OR "Egypt" OR "Malawi" OR "Cairo" OR "Al Minya" OR "Equatorial Guinea" OR "Guinee equatoriale" OR "Malabo" OR "Eritrea" OR "Asmara" OR "Ethiopia" OR "Ethiopie" OR "Addis Ababa" OR "Gabon" OR "Gabonese Republic" OR "Libreville" OR "Gambia" OR "Gambie" OR "Banjul" OR "Ghana" OR "Accra" OR "Takoradi" OR "Sekondi" OR "Koforidua" OR "Obuasi" OR "Kumasi" OR "Tamale" OR "Republic of Guinea" OR "Guinea" OR "Guinee" OR "Conakry" OR "Guinea-Bissau" OR "Guine-Bissau" OR "Bissau" OR "Kenya" OR "Kenia" OR "Nairobi" OR "Mombasa" OR "Lesotho" OR "Maseru" OR "Liberia" OR "Republic of Liberia" OR "Liberia" OR "Libya" OR "Libya" OR "Libye" OR "Libia" OR "Madagascar" OR "Madagaskar" OR "Madagasikara" OR "Antananarivo" OR "Toliara" OR "Fianarantsoa" OR "Antsirabe" OR "Toamasina" OR "Mahajanga" OR "Malawi" OR "Malawi" OR "Lilongwe" OR "Mali" OR "Bamako" OR "Sikasso" OR "Koutiala" OR "Koulikoro" OR "Segou" OR "Kayes" OR "Mopti" OR "Mauritania" OR "Mauritanie" OR "Nouakchott" OR "Mauritius" OR "Ile Maurice" OR "Morocco" OR "Morocco" OR "Maroc" OR "Marruecos" OR "Rabat" OR "casablanca" OR "Mozambique" OR "Mosambik" OR "Mocambique" OR "Maputo" OR "Namibia" OR "Namibie" OR "Windhoek" OR "Niger" OR "Niamey" OR "Maradi" OR "Zinder" OR "Tillaberi" OR "Tahoua" OR "Agadez" OR "Nigeria" OR "Abuja" OR "Rwanda" OR "Ruanda" OR "Kigali" OR "Sao Tome" OR "Sao Tome" OR "Senegal" OR "Senegal" OR "Dakar" OR "Ziguinchor" OR "Seychelles" OR "Sierra Leone" OR "Somalia" OR "Somalie" OR "Mogadishu" OR "South Africa" OR "Afrique du Sud" OR "Pretoria" OR "Stellenbosch" OR "Cape Town" OR "Johannesburg" OR "South Sudan" OR "Sudsudan" OR "Juba" OR "Sudan" OR "Soudan" OR "Khartoum" OR "Swaziland" OR "eSwatini" OR "Mbabane" OR "Tanzania" OR "Zanzibar" OR "Tanganyika" OR "Tansania" OR "Tanzanie" OR "Dodoma" OR "Togo" OR "Lome" OR "Tunisia" OR "Tunesien" OR "Tunisie" OR "Tunis" OR "Gabes" OR "Uganda" OR "Ouganda" OR "Kampala" OR "Zambia" OR "Rhodesia" OR "Sambia" OR "Zambie" OR "Lusaka" OR "Zimbabwe" OR "Simbabwe" OR "Harare")</p> <p>Databases = WOS, CCC, KJD, MEDLINE, RSCI, SCIELO Timespan = 2019–2021</p> <p>Search language = Auto</p>
#1	<p>TI = ("sars cov 2" OR "covid" OR "COVID 19" OR "COVID 19" OR "ncov" OR "2019 ncov" OR "2019nCoV" OR "novel coronavirus" OR "COVID 19" OR "covid19" OR "covid" OR "new coronavirus" OR "new corona virus" OR "novel corona virus" OR ("Wuhan" AND ("coronavirus" OR "coronavirus" OR "coronaviruses")) OR "sars cov" OR "Coronavirus Disease" OR "SARS-Cov2" OR "Coronavirus 2" OR "2019 coronavirus" OR "coronavirus 2019" OR "Corona Virus Disease" OR "SARS coronavirus" OR "Coronavirus pandemic" OR "coronavirus outbreak*" OR "china corona*" OR "coronavirus" OR "coronaviruses" OR "corona virus")</p> <p>Databases = WOS, CCC, KJD, MEDLINE, RSCI, SCIELO Timespan = 2019–2021</p> <p>Search language = Auto</p>

## 1.2.2. PubMed Search Query

#3	#1 AND #2
#2	Search: "sars cov 2"[Title] OR "covid"[Title] OR "COVID 19"[Title] OR "COVID 19"[Title] OR "ncov"[Title] OR "2019 ncov"[Title] OR "2019nCoV"[Title] OR "novel coronavirus"[Title] OR "COVID 19"[Title] OR "covid19"[Title] OR "covid"[Title] OR "new coronavirus"[Title] OR "new corona virus"[Title] OR "novel corona virus"[Title] OR ("Wuhan"[Title] AND ("coronavirus"[Title] OR "coronavirus"[Title] OR "coronaviruses"))[Title] OR "sars cov"[Title] OR "Coronavirus Disease"[Title] OR "SARS-Cov2"[Title] OR "Coronavirus 2"[Title] OR "2019 coronavirus"[Title] OR "coronavirus 2019"[Title] OR "Corona Virus Disease"[Title] OR "SARS coronavirus"[Title] OR "Coronavirus pandemic"[Title] OR "coronavirus outbreak*"[Title] OR "china corona*"[Title] OR "coronavirus"[Title] OR "coronaviruses"[Title] OR "corona virus"[Title] Filters: from 2019/12 - 2021/3 Sort by: Publication Date
#1	Search: "Algeria"[Affiliation] OR "Algerien"[Affiliation] OR "Algerie"[Affiliation] OR "Algiers"[Affiliation] OR "Alger"[Affiliation] OR "Angola"[Affiliation] OR "Bangui"[Affiliation] OR "Republique centrafricaine"[Affiliation] OR "Central African Republic"[Affiliation] OR "Benin"[Affiliation] OR "Dahomey"[Affiliation] OR "Benin"[Affiliation] OR "Porto-Novo"[Affiliation] OR "Botswana"[Affiliation] OR "Kalahari"[Affiliation] OR "Gaborone"[Affiliation] OR "Burkina Faso"[Affiliation] OR "Burkina"[Affiliation] OR "Ouagadougou"[Affiliation] OR "Banfora"[Affiliation] OR "Bobo Dioulasso"[Affiliation] OR "Burundi"[Affiliation] OR "Bujumbura"[Affiliation] OR "Gitega"[Affiliation] OR "Cameroon"[Affiliation] OR "Cameroun"[Affiliation] OR "Yaounde"[Affiliation] OR "Douala"[Affiliation] OR "Bafoussam"[Affiliation] OR "Bamenda"[Affiliation] OR "Garoua"[Affiliation] OR "Maroua"[Affiliation] OR "Cape Verde"[Affiliation] OR "Cabo Verde"[Affiliation] OR "Praia"[Affiliation] OR "Chad"[Affiliation] OR "Tchad"[Affiliation] OR "N'Djamena"[Affiliation] OR "Tschad"[Affiliation] OR "Comoros"[Affiliation] OR "Comores"[Affiliation] OR "Congo"[Affiliation] OR "Republic of the Congo"[Affiliation] OR "Kongo"[Affiliation] OR "Brazzaville"[Affiliation] OR "Cote d'Ivoire"[Affiliation] OR "Ivory Coast"[Affiliation] OR "Cote d'Ivoire"[Affiliation] OR "Yamoussoukro"[Affiliation] OR "Abidjan"[Affiliation] OR "Bouake"[Affiliation] OR "Korhogo"[Affiliation] OR "Democratic Republic of the Congo"[Affiliation] OR "Kinshasa"[Affiliation] OR "Zaire"[Affiliation] OR "Republique democratique du Congo"[Affiliation] OR "Djibouti"[Affiliation] OR "Egypt"[Affiliation] OR "Malawi"[Affiliation] OR "Cairo"[Affiliation] OR "Al Minya"[Affiliation] OR "Equatorial Guinea"[Affiliation] OR "Guinee equatoriale"[Affiliation] OR "Malabo"[Affiliation] OR "Eritrea"[Affiliation] OR "Asmara"[Affiliation] OR "Ethiopia"[Affiliation] OR "Ethiopie"[Affiliation] OR "Addis Ababa"[Affiliation] OR "Gabon"[Affiliation] OR "Gabonese Republic"[Affiliation] OR "Libreville"[Affiliation] OR "Gambia"[Affiliation] OR "Gambie"[Affiliation] OR "Banjul"[Affiliation] OR "Ghana"[Affiliation] OR "Accra"[Affiliation] OR "Takoradi"[Affiliation] OR "Sekondi"[Affiliation] OR "Koforidua"[Affiliation] OR "Obuasi"[Affiliation] OR "Kumasi"[Affiliation] OR "Tamale"[Affiliation] OR "Republic of Guinea"[Affiliation] OR "Guinea"[Affiliation] OR "Guinee"[Affiliation] OR "Conakry"[Affiliation] OR "Guinea-Bissau"[Affiliation] OR "Guine-Bissau"[Affiliation] OR "Bissau"[Affiliation] OR "Kenya"[Affiliation] OR "Kenia"[Affiliation] OR "Nairobi"[Affiliation] OR "Mombasa"[Affiliation] OR "Lesotho"[Affiliation] OR "Maseru"[Affiliation] OR "Liberia"[Affiliation] OR "Republic of Liberia"[Affiliation] OR "Liberia"[Affiliation] OR "Libya"[Affiliation] OR "Libya"[Affiliation] OR "Libye"[Affiliation] OR "Libia"[Affiliation] OR "Madagascar"[Affiliation] OR "Madagasikara"[Affiliation] OR "Antananarivo"[Affiliation] OR "Toliara"[Affiliation] OR "Fianarantsoa"[Affiliation] OR "Antsirabe"[Affiliation] OR "Toamasina"[Affiliation] OR "Mahajanga"[Affiliation] OR "Malawi"[Affiliation] OR "Malawi"[Affiliation] OR "Lilongwe"[Affiliation] OR "Mali"[Affiliation] OR "Bamako"[Affiliation] OR "Sikasso"[Affiliation] OR "Koutiala"[Affiliation] OR "Koulikoro"[Affiliation] OR "Segou"[Affiliation] OR "Kayes"[Affiliation] OR

<p>"Mopti"[Affiliation] OR "Mauritania"[Affiliation] OR "Mauritanie"[Affiliation] OR "Nouakchott"[Affiliation] OR "Mauritius"[Affiliation] OR "Ile Maurice"[Affiliation] OR "Morocco"[Affiliation] OR "Morocco"[Affiliation] OR "Maroc"[Affiliation] OR "Marruecos"[Affiliation] OR "Rabat"[Affiliation] OR "casablanca"[Affiliation] OR "Mozambique"[Affiliation] OR "Mosambik"[Affiliation] OR "Mocambique"[Affiliation] OR "Maputo"[Affiliation] OR "Namibia"[Affiliation] OR "Namibie"[Affiliation] OR "Windhoek"[Affiliation] OR "Niger"[Affiliation] OR "Niamey"[Affiliation] OR "Maradi"[Affiliation] OR "Zinder"[Affiliation] OR "Tillaberi"[Affiliation] OR "Tahoua"[Affiliation] OR "Agadez"[Affiliation] OR "Nigeria"[Affiliation] OR "Abuja"[Affiliation] OR "Rwanda"[Affiliation] OR "Ruanda"[Affiliation] OR "Kigali"[Affiliation] OR "Sao Tome"[Affiliation] OR "Sao Tome"[Affiliation] OR "Senegal"[Affiliation] OR "Senegal"[Affiliation] OR "Dakar"[Affiliation] OR "Ziguinchor"[Affiliation] OR "Seychelles"[Affiliation] OR "Sierra Leone"[Affiliation] OR "Somalia"[Affiliation] OR "Somalie"[Affiliation] OR "Mogadishu"[Affiliation] OR "South Africa"[Affiliation] OR "Afrique du Sud"[Affiliation] OR "Pretoria"[Affiliation] OR "Stellenbosch"[Affiliation] OR "Cape Town"[Affiliation] OR "Johannesburg"[Affiliation] OR "South Sudan"[Affiliation] OR "Sudsudan"[Affiliation] OR "Juba"[Affiliation] OR "Sudan"[Affiliation] OR "Soudan"[Affiliation] OR "Khartoum"[Affiliation] OR "Swaziland"[Affiliation] OR "eSwatini"[Affiliation] OR "Mbabane"[Affiliation] OR "Tanzania"[Affiliation] OR "Zanzibar"[Affiliation] OR "Tanganyika"[Affiliation] OR "Tansania"[Affiliation] OR "Tanzanie"[Affiliation] OR "Dodoma"[Affiliation] OR "Togo"[Affiliation] OR "Lome"[Affiliation] OR "Tunisia"[Affiliation] OR "Tunesien"[Affiliation] OR "Tunisie"[Affiliation] OR "Tunis"[Affiliation] OR "Gabes"[Affiliation] OR "Uganda"[Affiliation] OR "Ouganda"[Affiliation] OR "Kampala"[Affiliation] OR "Zambia"[Affiliation] OR "Rhodesia"[Affiliation] OR "Sambia"[Affiliation] OR "Zambie"[Affiliation] OR "Lusaka"[Affiliation] OR "Zimbabwe"[Affiliation] OR "Simbabwe"[Affiliation] OR "Harare"[Affiliation] Filters: from 2019/12 - 2021/3 Sort by: Publication Date</p>
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### 1.2.3. AJOL Search Query

(covid OR coronavirus) AND Africa

**Table S1.** COVID-19 research collaboration between African countries and non-African countries.

[illegible]

Table S2. COVID-19 research collaboration between African countries.

	Central Africa	Eastern Africa	North Africa	Southern Africa	Western Africa
	Cameroon Central African Republic Chad Congo D R Congo Equatorial Guinea Gabon	Burundi Comoros Eritrea Ethiopia Kenya Madagascar Mauritius Rwanda Seychelles Somalia South Sudan Sudan Tanzania Uganda	Algeria Djibouti Egypt Libya Morocco Tunisia	Angola Botswana Lesotho Malawi Mozambique Namibia South Africa Swaziland Zambia Zimbabwe	Benin Burkina Faso Ghana Guinea Guinea-Bissau Ivory Coast Liberia Mali Mauritania Niger Nigeria Senegal Sierra Leone The Gambia Togo
Central Africa	Cameroon 127 Central African Republic 5 5 Chad 5 Congo 2 2 43 D R Congo 7 1 2 81 Equatorial Guinea 3 Gabon 1 1 22				
Eastern Africa	Burundi 1 Comoros Eritrea Ethiopia 5 1 2 2 Kenya 13 2 9 Madagascar 3 2 2 1 1 Mauritius 1 Rwanda 4 6 Seychelles Somalia 1 South Sudan Sudan 2 1 Tanzania 6 2 4 2 Uganda 9 1 6	5 2 4 322 2 14 289 2 4 29 3 1 32 4 10 51 1 1 2 1 12 1 1 4 3 5 113 5 14 7 1 3 89 10 29 7 3 4 17 169			
North Africa	Algeria 1 Djibouti Egypt 9 2 Libya Morocco 2 Tunisia 1	3 1 4 5 16 1 3 1 19 6 10 4 2 5 1 1 1 6 1 3 4 1 6 4 11	113 3 18 1 1220 2 9 56 18 21 366 28 2 12 159		
Southern Africa	Angola Botswana 2 Lesotho Malawi 2 1 1 1 Mozambique 2 4 Namibia 1 South Africa 19 1 9 19 1 Swaziland 1 Zambia 3 4 4 Zimbabwe 4 3 1 1	1 4 1 1 1 3 11 3 1 4 4 1 1 3 1 1 3 1 13 62 4 6 14 1 1 1 4 10 2 1 4 11 2 3 4 10	5 1 2 7 3 5 8 1 2 11 17 31 1 4 6 9 3 4 10	3 29 3 3 1 57 1 2 65 2 2 17 8 2 15 11 41452 1 1 2 11 3 6 2 13 1 57 7 2 3 4 3 1 32 1 4 91	
Western Africa	Benin 3 1 4 2 Burkina Faso 3 3 4 1 2 Ghana 13 2 5 3 2 Guinea 4 1 1 3 Guinea-Bissau 1 1 Ivory Coast 6 1 1 1 Liberia 1 2 Mali 2 4 Mauritania 2 1 Niger 4 2 2 Nigeria 11 2 6 Senegal 8 2 1 2 4 Sierra Leone 1 The Gambia 1 Togo 1 1 4	1 2 1 2 5 3 7 19 2 1 6 1 1 1 2 1 1 1 1 4 2 19 43 1 2 9 4 6 4 2 3 1 2 1 1 2 1 1 2	1 1 1 2 1 1 1 2 1 3 11 4 6 2 3 1 1 2 1 1 2 4 36 5 7 16 2 2 1 2 3 2 1 2 1 2 1 1	3 3 2 1 1 1 57 2 2 65 2 2 17 8 2 15 11 41452 1 1 2 11 3 6 2 13 1 57 7 2 3 4 3 1 32 1 4 91	27 2 35 4 1 234 6 5 2 21 2 1 1 6 1 2 4 2 21 2 1 9 2 3 1 1 41 1 1 1 6 2 2 2 1 1 15 4 1 32 2 4 2 2 757 3 7 7 4 1 6 1 2 1 9 88 4 1 1 1 1 1 1 2 2 1 1 1 1 23 10