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FILENAME CDDEP '/folders/myfolders/Thabo Mabuka/ARI/CDDEP paper/20210525_Data extraction file_Thabo.xlsx';
Libname CDDEP '/folders/myfolders/Thabo Mabuka/ARI/CDDEP paper';

Proc Import Datafile=CDDEP
    DBMS=XLSX
    Replace
    OUT=CDDEP.CDDEP;
    GETNAMES=YES;
RUN;

Proc Contents Data=CDDEP.CDDEP;
Run;

Proc Freq Data=CDDEP_Descrpt1;
Tables Place_of_Publication Region_of_Author Sub_Region_of_Author;
Run;

****1. Description/comparison of predicted impact of NPI***;
Proc Contents Data=CDDEP_Descrpt1;
Run;

Proc Freq Data=CDDEP.CDDEP_Descrpt1;
Tables Location_of_First_Author_Institu Region_of_Author Sub_Region_of_Author Place_of_Publication/MISSING;
Run;

Proc SQL;
Create Table CDDEP_Descrpt As Select Entry_Number,Article_Title,Institution_of_First_Author,Other_Author_Instiutions,
Location_of_First_Author_Institu,Date_of_Publication, Place_of_Publication, Countries_Covered from CDDEP.CDDEP;
Quit;

Data CDDEP.CDDEP_Descrpt1 (Rename=(Region=Region_of_Author Sub_Region=Sub_Region_of_Author Countries=Countries_Covered));
length Region_of_Author  $ 200;
length Sub_Region_of_Author  $ 200;
format Region_of_Author $200.;
format Sub_Region_of_Author $200.;
Informat Region_of_Author $200.;
Informat Sub_Region_of_Author $200.;
Set CDDEP_Descrpt;
Where Article_Title IS not MISSING;
If Location_of_First_Author_Institu='Abomey Calavi, Benin' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Abomey Calavi, Benin' then Sub_Region_of_Author='Western Africa';
If Location_of_First_Author_Institu='Abu Dhabi, United Arab Emirates' then Region_of_Author='Asia';
If Location_of_First_Author_Institu='Abu Dhabi, United Arab Emirates' then Sub_Region_of_Author='Middle East';
If Location_of_First_Author_Institu='Adama,Ethiopia' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Adama,Ethiopia' then Sub_Region_of_Author='East Africa';
If Location_of_First_Author_Institu='Algiers, Algeria' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Algiers, Algeria' then Sub_Region_of_Author='North Africa';
If Location_of_First_Author_Institu='Athens, GA USA' then Region_of_Author='America';
If Location_of_First_Author_Institu='Athens, GA USA' then Sub_Region_of_Author='North America';
If Location_of_First_Author_Institu='Beijing, China' then Region_of_Author='Asia';
If Location_of_First_Author_Institu='Beijing, China' then Sub_Region_of_Author='East Asia';
If Location_of_First_Author_Institu='Berkeley, USA' then Region_of_Author='America';
If Location_of_First_Author_Institu='Berkeley, USA' then Sub_Region_of_Author='North America';
If Location_of_First_Author_Institu='Bouira, Algeria' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Bouira, Algeria' then Sub_Region_of_Author='North Africa';
If Location_of_First_Author_Institu='Bukavu, Democratic Republic of the Congo' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Bukavu, Democratic Republic of the Congo' then Sub_Region_of_Author='Central Africa';
If Location_of_First_Author_Institu='Cairo, Egypt' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Cairo, Egypt' then Sub_Region_of_Author='North Africa';
If Location_of_First_Author_Institu='California, USA' then Region_of_Author='America';
If Location_of_First_Author_Institu='California, USA' then Sub_Region_of_Author='North America';
If Location_of_First_Author_Institu='Coimbatore, India' then Region_of_Author='Asia';
If Location_of_First_Author_Institu='Coimbatore, India' then Sub_Region_of_Author='South Asia';
If Location_of_First_Author_Institu='Djelfa, Algeria' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Djelfa, Algeria' then Sub_Region_of_Author='North Africa';
If Location_of_First_Author_Institu='France' then Region_of_Author='Europe';
If Location_of_First_Author_Institu='France' then Sub_Region_of_Author='Eastern Europe';
If Location_of_First_Author_Institu='Gauteng, South Africa' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Gauteng, South Africa' then Sub_Region_of_Author='Southern Africa';
If Location_of_First_Author_Institu='Gondar, Ethiopia' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Gondar, Ethiopia' then Sub_Region_of_Author='East Africa';
If Location_of_First_Author_Institu='Hefei, China' then Region_of_Author='Asia';
If Location_of_First_Author_Institu='Hefei, China' then Sub_Region_of_Author='East Asia';
If Location_of_First_Author_Institu='Honolulu, Hawaii, USA' then Region_of_Author='America';
If Location_of_First_Author_Institu='Honolulu, Hawaii, USA' then Sub_Region_of_Author='North America';
If Location_of_First_Author_Institu='Jabalpur, India' then Region_of_Author='Asia';
If Location_of_First_Author_Institu='Jabalpur, India' then Sub_Region_of_Author='East Asia';
If Location_of_First_Author_Institu='Johannesburg, South Africa' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Johannesburg, South Africa' then Sub_Region_of_Author='Southern Africa';
If Location_of_First_Author_Institu='Keppel Street, London, UK' then Region_of_Author='Europe';
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If Location_of_First_Author_Institu='Keppel Street, London, UK' then Sub_Region_of_Author='Western Europe';
If Location_of_First_Author_Institu='GLeipzig, Germany' then Region_of_Author='Europe';
If Location_of_First_Author_Institu='Leipzig, Germany' then Sub_Region_of_Author='Western Europe';
If Location_of_First_Author_Institu='London, UK' then Region_of_Author='Europe';
If Location_of_First_Author_Institu='London, UK' then Sub_Region_of_Author='Western Europe';
If Location_of_First_Author_Institu='London, UK' then Location_of_First_Author_Institu='London,United Kingdom';
If Location_of_First_Author_Institu='Los Angeles, USA' then Region_of_Author='America';
If Location_of_First_Author_Institu='Los Angeles, USA' then Sub_Region_of_Author='North America';
If Location_of_First_Author_Institu='Machakos, Kenya' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Machakos, Kenya' then Sub_Region_of_Author='East Africa';
If Location_of_First_Author_Institu='Madrid, Spain.' then Region_of_Author='Europe';
If Location_of_First_Author_Institu='Madrid, Spain.' then Sub_Region_of_Author='Western Europe';
If Location_of_First_Author_Institu='Manipal, India' then Region_of_Author='Asia';
If Location_of_First_Author_Institu='Manipal, India' then Sub_Region_of_Author='East Asia';
If Location_of_First_Author_Institu='New Haven, USA' then Region_of_Author='America';
If Location_of_First_Author_Institu='New Haven, USA' then Sub_Region_of_Author='North America';
If Location_of_First_Author_Institu='Oxford, United Kingdom' then Region_of_Author='Europe';
If Location_of_First_Author_Institu='Oxford, United Kingdom' then Sub_Region_of_Author='Western Europe';
If Location_of_First_Author_Institu='Pretoria, South Africa' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Pretoria, South Africa' then Sub_Region_of_Author='Southern Africa';
If Location_of_First_Author_Institu='Seattle, USA' then Region_of_Author='America';
If Location_of_First_Author_Institu='Seattle, USA' then Sub_Region_of_Author='North America';
If Location_of_First_Author_Institu='South Africa, Cameroon' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='South Africa, Cameroon' then Sub_Region_of_Author='Southern Africa, Central Africa';
If Location_of_First_Author_Institu='Stillwater,USA' then Region_of_Author='America';
If Location_of_First_Author_Institu='Stillwater,USA' then Sub_Region_of_Author='North America';
If Location_of_First_Author_Institu='Toronto, USA' then Region_of_Author='America';
If Location_of_First_Author_Institu='Toronto, USA' then Sub_Region_of_Author='North America';
If Location_of_First_Author_Institu='Tororo, Uganda' then Region_of_Author='Africa';
If Location_of_First_Author_Institu='Tororo, Uganda' then Sub_Region_of_Author='East Africa';
If Location_of_First_Author_Institu='Townsville, Australia' then Region_of_Author='Australia';
If Location_of_First_Author_Institu='Townsville, Australia' then Sub_Region_of_Author='Australia';
If Location_of_First_Author_Institu='Tshinghua, China' then Region_of_Author='Asia';
If Location_of_First_Author_Institu='Tshinghua, China' then Sub_Region_of_Author='East Asia';
If Location_of_First_Author_Institu='UK' then Region_of_Author='Europe';
If Location_of_First_Author_Institu='UK' then Sub_Region_of_Author='Western Europe';
If Location_of_First_Author_Institu='UK' then Location_of_First_Author_Institu='United Kingdom';
If Location_of_First_Author_Institu='Warwick, United Kingdom' then Region_of_Author='Europe';
If Location_of_First_Author_Institu='Warwick, United Kingdom' then Sub_Region_of_Author='Western Europe';
If Location_of_First_Author_Institu='Washington, DC' then Region_of_Author='America';
If Location_of_First_Author_Institu='Washington, DC' then Sub_Region_of_Author='North America';
Region=UPCASE(Region_of_Author);
Sub_Region=UPCASE(Sub_Region_of_Author);
Countries=Compress(Countries_Covered);
Drop Region_of_Author Sub_Region_of_Author Countries_Covered;
Proc Sort; by Entry_Number;
Run;



****2. Comparison of model methodologies and projections****;
Proc Freq Data=CDDEP.CDDEP_Meth1;
/* Tables Place_of_Publication Region_of_Author Sub_Region_of_Author;  */
Run;

Proc SQL;
Create Table CDDEP_Meth As Select Entry_Number,Type_of_Model,Countries_Covered, Time_Period_of_Simulation,
Time_Period_of_Case_Data_Used_to,Time_Period_of_Lockdown,Model_Parameters,Model_Parameter_Value,Model_Parameter_Units,
Model_Assumptions from CDDEP.CDDEP;
Quit;

Proc Freq Data=CDDEP_meth;
Run;

***Sorting out the Countries_Covered in Entries O1,M23,M10,P2, P18,M30,P24,M31 and M32;
Data CDDEP_Meth1;
Set CDDEP_Meth;
Countries_Covered_=Compress(Strip(Countries_Covered));
If Entry_Number='O1' OR Entry_Number='M23' OR Entry_Number='M10' OR Entry_Number='P2'
OR Entry_Number='P18' OR Entry_Number='M30' OR Entry_Number='P24' OR Entry_Number='M31'
OR Entry_Number='M32'
then Do i=1 to (Countw(Countries_Covered_));
        Countries_Covered=scan(Countries_Covered_,i,',');
    Output;
End;
Drop i Countries_Covered_;
Proc Sort; by Countries_Covered;
Run;

**Cleaning Dates in Time Period of Simulation and creating Simulation period start and stop dates;
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Data CDDEP_Meth2;
Set CDDEP_Meth1;
If Countries_Covered="US" then Countries_Covered="United States of America";
If (Entry_Number in ('P2')) AND (Countries_Covered in ('Ghana')) then Time_Period_of_Simulation='2020/03/12-2020/09/28';
If (Entry_Number in ('P2')) AND (Countries_Covered in ('Kenya')) then Time_Period_of_Simulation='2020/03/12-2020/09/28';
If (Entry_Number in ('P2')) AND (Countries_Covered in ('Senegal')) then Time_Period_of_Simulation='2020/03/02-2020/09/18';
If Time_Period_of_Simulation='43892' then Time_Period_of_Simulation='2020/03/02';
If Time_Period_of_Simulation='43903' then Time_Period_of_Simulation='2020/03/13';
If Time_Period_of_Simulation='43904' then Time_Period_of_Simulation='2020/03/14';

position=find(Time_Period_of_Simulation,'-');
Wlength=Length(Time_Period_of_Simulation);
if position>0 then Simulation_StDt=tranwrd(Substr(Time_Period_of_Simulation,1,position),'-','');
if position>0 then Simulation_EnDt=tranwrd(Substr(Time_Period_of_Simulation,position,Wlength),'-','');
position1=find(Time_Period_of_Case_Data_Used_to,'-');
Wlength1=Length(Time_Period_of_Case_Data_Used_to);
if position1>0 then Case_Data_Used_StDt=tranwrd(Substr(Time_Period_of_Case_Data_Used_to,1,position1),'-','');
if position1>0 then Case_Data_Used_EnDt=tranwrd(Substr(Time_Period_of_Case_Data_Used_to,position1,Wlength1),'-','');
Drop position Wlength position1 Wlength1;
If Case_Data_Used_StDt="Until" then Case_Data_Used_StDt="";
If Case_Data_Used_StDt="Up to" then Case_Data_Used_StDt="";
Proc Sort; By Countries_Covered;
Run;

***Sorting out the Time_Period_of_Lockdown in Entries O1;
Data CDDEP_Meth3 (keep=Countries_Covered Time_Period_of_Lockdown);
Set CDDEP_Meth2;
Time_Period_of_Lockdown_=Compress(Strip(Time_Period_of_Lockdown));
If Entry_Number="O1"
then Do i=1 to (Countw(Time_Period_of_Lockdown_));
        Time_Period_of_Lockdown=scan(Time_Period_of_Lockdown_,i,';');
    Output;
End;
Drop i Time_Period_of_Lockdown_;
Run;

Data CDDEP_Meth4(Rename=(Countries_Covered_=Countries_Covered Time_Period_of_Lockdown_=Time_Period_of_Lockdown_A));
Set  CDDEP_Meth3;
Where Countries_Covered="Algeria";
Where Time_Period_of_Lockdown IS NOT MISSING;
position=find(Time_Period_of_Lockdown,',');
Wlength=Length(Time_Period_of_Lockdown);
if position>0 then Countries_Covered_=Compress(Strip(tranwrd(Substr(Time_Period_of_Lockdown,1,position),',','')));
if position>0 then Time_Period_of_Lockdown_=Compress(Strip(tranwrd(Substr(Time_Period_of_Lockdown,position,Wlength),',','')));
Drop Countries_Covered Time_Period_of_Lockdown position Wlength;
ref+1;
Proc Sort Nodupkey; by Countries_Covered;
Run;

Proc SQL;
Delete from CDDEP_Meth4 WHERE Ref=31;
Insert Into CDDEP_Meth4 (Countries_Covered,Time_Period_of_Lockdown_A)
Values ("Mauritania","60");
Insert Into CDDEP_Meth4 (Countries_Covered,Time_Period_of_Lockdown_A)
Values ("Mauritius","64");
Alter Table CDDEP_Meth4 Drop Ref;
Quit;
***Sorting out the Time_Period_of_Lockdown in Entries O1 and O1-Others;
Data CDDEP_Meth_O1_All;
Set CDDEP_Meth2;
Where Entry_Number="O1";
Proc Sort; by Countries_Covered;
Run;

Data CDDEP_Meth_O1_All_Sorted (Rename=(Time_Period_of_Lockdown_A=Time_Period_of_Lockdown));
Merge CDDEP_Meth_O1_All (in=a) CDDEP_Meth4(in=b);
by Countries_Covered;
If a;
Drop Time_Period_of_Lockdown;
Proc Sort; by Countries_Covered;
Run;

Data CDDEP_Meth_O1_Others_Sorted;
Set CDDEP_Meth2;
Where Entry_Number<>"O1";
Run;

Data CDDEP_Meth_O1ANDOthers_Sorted(Rename=(Countries_Covered_=Countries_Covered));
Set CDDEP_Meth_O1_Others_Sorted CDDEP_Meth_O1_All_Sorted;
Countries_Covered_=Compress(Countries_Covered);
Drop Countries_Covered;
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Run;

Proc Freq Data=CDDEP_Meth_O1ANDOthers_Sorted;
Run;

****Cleaning the rest of the CDDEP_Meth file***;
Data CDDEP_Meth5;
Set  CDDEP_Meth;
Where Entry_Number<>'O1'AND Entry_Number<>'M23' AND Entry_Number<>'M23' AND Entry_Number<>'M10' AND Entry_Number<>'P2'
AND Entry_Number<>'P18' AND Entry_Number<>'M30' AND Entry_Number<>'P24' AND Entry_Number<>'M31' AND Entry_Number<>'M32';
If Time_Period_of_Simulation='43892' then Time_Period_of_Simulation='2020/03/02';
If Time_Period_of_Simulation='43903' then Time_Period_of_Simulation='2020/03/13';
If Time_Period_of_Simulation='43904' then Time_Period_of_Simulation='2020/03/14';
Run;

****Soring out M3 Time_Period_of_Case_Data_Used_to ***;
Data CDDEP_Meth6;
Set CDDEP_Meth5;
Time_Period_of_Case_Data_Used_t_=Time_Period_of_Case_Data_Used_to;
If Entry_Number='M3'
then Do i=1 to (Countw(Time_Period_of_Case_Data_Used_t_));
        Time_Period_of_Case_Data_Used_to=scan(Time_Period_of_Case_Data_Used_t_,i,',');
    Output;
End;
Drop i Time_Period_of_Case_Data_Used_t_;
Proc Sort; by Countries_Covered;
Run;

Data CDDEP_Meth7;
Set CDDEP_Meth6;
Where Time_Period_of_Case_Data_Used_to Is NOT MISSING;
Run;

Data CDDEP_Meth8;
Set CDDEP_Meth5;
Where Entry_Number<>"M3";
Run;

Proc Freq Data=CDDEP_Meth_Rest;
Run;

Data CDDEP_Meth_Rest(Rename=(Countries_Covered_=Countries_Covered));
Set CDDEP_Meth8 CDDEP_Meth7;
position=find(Time_Period_of_Simulation,'-');
Wlength=Length(Time_Period_of_Simulation);
if position>0 then Simulation_StDt=tranwrd(Substr(Time_Period_of_Simulation,1,position),'-','');
if position>0 then Simulation_EnDt=tranwrd(Substr(Time_Period_of_Simulation,position,Wlength),'-','');
position1=find(Time_Period_of_Case_Data_Used_to,'-');
Wlength1=Length(Time_Period_of_Case_Data_Used_to);
if position1>0 then Case_Data_Used_StDt=tranwrd(Substr(Time_Period_of_Case_Data_Used_to,1,position1),'-','');
if position1>0 then Case_Data_Used_EnDt=tranwrd(Substr(Time_Period_of_Case_Data_Used_to,position1,Wlength1),'-','');
Drop position Wlength position1 Wlength1;
If Case_Data_Used_StDt="Until" then Case_Data_Used_StDt="";
If Case_Data_Used_StDt="Upto" then Case_Data_Used_StDt="";
Format Simulation_EnDt $200.;
Informat Simulation_EnDt $200.;
If Entry_Number="M4" then Simulation_EnDt="2021/01/07";
If Entry_Number="M12" then Case_Data_Used_StDt="2020/04/01";
If Entry_Number="M12" then Case_Data_Used_EnDt="2020/08/01";
Countries_Covered_=Compress(Countries_Covered);
Drop Countries_Covered;
Proc Sort; By Countries_Covered;
Run;

Proc Freq Data=CDDEP.CDDEP_METH;
Tables Entry_Number Countries_Covered;
Run;

Data CDDEP.CDDEP_METH
(Rename=(Simulation_StDt_=Simulation_StDt Simulation_EnDt_=Simulation_EnDt
Case_Data_Used_StDt_=Case_Data_Used_StDt Case_Data_Used_EnDt_=Case_Data_Used_EnDt Countries_Covered_=Countries_Covered));
Set CDDEP_Meth_Rest CDDEP_Meth_O1ANDOthers_Sorted;
Format Simulation_StDt Simulation_EnDt Case_Data_Used_StDt Case_Data_Used_EnDt yymmdd10.;
Simulation_StDt_=Input(Compress(Simulation_StDt),yymmdd10.);
Simulation_EnDt_=Input(Compress(Simulation_EnDt),yymmdd10.);
Case_Data_Used_StDt_=Input(Compress(Case_Data_Used_StDt),yymmdd10.);
Case_Data_Used_EnDt_=Input(Compress(Case_Data_Used_EnDt),yymmdd10.);
If Countries_Covered="UnitedRepublicofTanzania" then Countries_Covered="Tanzania";
If Countries_Covered="DemocraticRepublicoftheCongo" then Countries_Covered="Congo(Kinshasa)";
If Countries_Covered="Congo" then Countries_Covered="Congo(Kinshasa)";
Format Simulation_StDt_ Simulation_EnDt_ Case_Data_Used_StDt_ Case_Data_Used_EnDt_ yymmdd10. Countries_Covered_ $200.;
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Countries_Covered_=Compress(Countries_Covered);
Drop Simulation_StDt Simulation_EnDt Case_Data_Used_StDt Case_Data_Used_EnDt Countries_Covered;
Proc Sort; by Countries_Covered;
Run;

FILENAME Meth "/folders/myfolders/Thabo Mabuka/ARI/CDDEP paper/CDDEP_METH.xlsx";**Had to export and import Excel to fix Countr

Proc Import Datafile=Meth
DBMS=XLSX
Replace
Out=CDDEP.CDDEP_METH;
    GETNAMES=YES;
Proc Sort; by Countries_Covered;
RUN;


Proc Freq Data=CDDEP.CDDEP_METH;
Tables Countries_Covered;
Run;

Data CDDEP.CDDEP_METH;
Set CDDEP.CDDEP_METH;
If Countries_Covered="Côted'Ivoire" Then Countries_Covered="Coted'Ivoire";
Run;

****COVID-19 Cases******;
FILENAME Cases '/folders/myfolders/Thabo Mabuka/ARI/CDDEP paper/time_series_covid19_confirmed_global_narrow.xlsx';

Proc Import Datafile=Cases
    DBMS=XLSX
    Replace
    OUT=CDDEP.COVID_Cases;
    GETNAMES=YES;
RUN;

Proc Contents Data=CDDEP.COVID_CASES;
Run;

Proc Freq Data=COVID_CASES;
Tables Countries_Covered;
Run;

Data COVID_CASES(Rename=(Date_=Date Value_=Value));
Set CDDEP.COVID_CASES(Keep=Country_Region Value Date);
Where Country_Region in ("Algeria","Angola","Benin","Botswana","Burkina Faso","Burundi","Cabo Verde"
,"Cameroon","Central African Republic","Chad","Comoros","Congo (Brazzaville)","Congo (Kinshasa)"
,"Cote d'Ivoire","Democratic Republic of the Congo","Djibouti","Egypt","Equatorial Guinea","Eritrea","Eswatini","Ethiopia"
,"Gabon","Gambia","Ghana","Guinea","Guinea-Bissau","Kenya","Lesotho","Liberia","Libya"
,"Madagascar","Malawi","Mali","Mauritania","Mauritius","Morocco","Mozambique","Namibia"
,"Niger","Nigeria","Rwanda","Sao Tome and Principe","Senegal","Seychelles","Sierra Leone"
,"Somalia","South Africa","South Sudan","Sudan","Tanzania","Togo","Tunisia","Uganda"
,"Western Sahara","Zambia","Zimbabwe") AND Date<>"#date";
Date_S=Input(Date, Best5.);
Date_=Date_S-21916;
Value_=Input(Value, Best10.);
Format Date_ yymmdd10.;
Countries_Covered=Compress(Country_Region);
Drop Date Value Date_S Country_Region;
Proc Sort; by Countries_Covered Date;
Run;

FILENAME Recover '/folders/myfolders/Thabo Mabuka/ARI/CDDEP paper/time_series_covid19_recovered_global_narrow.xlsx';

Proc Import Datafile=Recover
    DBMS=XLSX
    Replace
    OUT=CDDEP.COVID_Recovered;
    GETNAMES=YES;
RUN;

Proc Contents Data=CDDEP.COVID_Recovered;
Run;

Proc Freq Data=CDDEP.COVID_Recovered;
Run;

Data COVID_Recovered(Rename=(Date_=Date Value_=Value));
Set CDDEP.COVID_Recovered(Keep=Country_Region Value Date);
Where Country_Region in ("Algeria","Angola","Benin","Botswana","Burkina Faso","Burundi","Cabo Verde"
,"Cameroon","Central African Republic","Chad","Comoros","Congo (Brazzaville)","Congo (Kinshasa)"
,"Cote d'Ivoire","Democratic Republic of the Congo","Djibouti","Egypt","Equatorial Guinea","Eritrea","Eswatini","Ethiopia"
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,"Gabon","Gambia","Ghana","Guinea","Guinea-Bissau","Kenya","Lesotho","Liberia","Libya"
,"Madagascar","Malawi","Mali","Mauritania","Mauritius","Morocco","Mozambique","Namibia"
,"Niger","Nigeria","Rwanda","Sao Tome and Principe","Senegal","Seychelles","Sierra Leone"
,"Somalia","South Africa","South Sudan","Sudan","Tanzania","Togo","Tunisia","Uganda"
,"Western Sahara","Zambia","Zimbabwe") AND Date<>"#date";
Date_S=Input(Date, Best5.);
Date_=Date_S-21916;
Value_=Input(Value, Best10.);
Format Date_ yymmdd10.;
Countries_Covered=Compress(Country_Region);
Drop Date Value Date_S Country_Region;
Proc Sort; by Countries_Covered Date;
Run;

FILENAME Deaths '/folders/myfolders/Thabo Mabuka/ARI/CDDEP paper/time_series_covid19_deaths_global_narrow.xlsx';

Proc Import Datafile=Deaths
    DBMS=XLSX
    Replace
    OUT=CDDEP.COVID_Deaths;
    GETNAMES=YES;
RUN;

Proc Contents Data=CDDEP.COVID_Deaths;
Run;

Proc Freq Data=COVID_Deaths;
Tables Countries_Covered/Missing;
Run;

Data COVID_Deaths(Rename=(Date_=Date Value_=Value));
Set CDDEP.COVID_Deaths(Keep=Country_Region Value Date);
Where Country_Region in ("Algeria","Angola","Benin","Botswana","Burkina Faso","Burundi","Cabo Verde"
,"Cameroon","Central African Republic","Chad","Comoros","Congo (Brazzaville)","Congo (Kinshasa)"
,"Cote d'Ivoire","Democratic Republic of the Congo","Djibouti","Egypt","Equatorial Guinea","Eritrea","Eswatini","Ethiopia"
,"Gabon","Gambia","Ghana","Guinea","Guinea-Bissau","Kenya","Lesotho","Liberia","Libya"
,"Madagascar","Malawi","Mali","Mauritania","Mauritius","Morocco","Mozambique","Namibia"
,"Niger","Nigeria","Rwanda","Sao Tome and Principe","Senegal","Seychelles","Sierra Leone"
,"Somalia","South Africa","South Sudan","Sudan","Tanzania","Togo","Tunisia","Uganda"
,"Western Sahara","Zambia","Zimbabwe") AND Date<>"#date";
Date_S=Input(Date, Best10.);
Date_=Date_S-21916;
Value_=Input(Value, Best5.);
Format Date_ yymmdd10.;
Countries_Covered=Compress(Country_Region);
Drop Date Value Date_S Country_Region;
Proc Sort; by Countries_Covered Date;
Run;

****Sorting out Simulation Dates in Entry O1****;
Proc Freq Data=CDDEP.CDDEP_Meth2;
Run;

Data CDDEP.CDDEP_Meth2_01(Drop=Value Date);
length Countries_Covered $200.;
Merge CDDEP.CDDEP_METH(in=a Where=(Entry_Number="O1" AND Countries_Covered<>" ")) COVID_CASES(in=b Where=(Value>=20));
by Countries_Covered;
If a;
Simulation_StDt=Date;
Simulation_EnDt=Date+200;
Proc Sort Nodupkey; by Countries_Covered;
Run;

Data CDDEP.CDDEP_METH;
length Countries_Covered $200.;
Set CDDEP.CDDEP_METH (Where=(Entry_Number<>"01")) CDDEP.CDDEP_Meth2_01;
Proc Sort; by Countries_Covered;
Run;

****Merging CDDEP_Meth with Cases,Recoveries and Deaths****;
***Cases in Simulation period and Used in Seeding****;
Data Meth_SimSt;
Set CDDEP.CDDEP_METH;
Proc Sort;
by Countries_Covered Simulation_StDt;
Run;

Proc Freq Data=Meth_Cases2;
Run;

Data Meth_Cases(Rename=(Value=COVID_Cases_StDt));
```

```
Merge Meth_SimSt(in=a) COVID_CASES(Rename=(Date=Simulation_StDt));
by Countries_Covered Simulation_StDt;
if a;
Run;

Data Meth_Cases2(Rename=(Value=COVID_Recovered_StDt));
Merge Meth_Cases(in=a) COVID_Recovered(Rename=(Date=Simulation_StDt));
by Countries_Covered Simulation_StDt;
if a;
Run;

Data Meth_Cases3(Rename=(Value=COVID_Deaths_StDt));
Merge Meth_Cases2(in=a) COVID_Deaths(Rename=(Date=Simulation_StDt));
by Countries_Covered Simulation_StDt;
if a;
Run;

Data Meth_SimEnd;
Set Meth_Cases3;
Proc Sort;
by Countries_Covered Simulation_EnDt;
Run;

Proc Freq Data=Meth_Cases6;
Run;

Data Meth_Cases4(Rename=(Value=COVID_Cases_EnDt));
Merge Meth_SimEnd(in=a) COVID_CASES(Rename=(Date=Simulation_EnDt));
by Countries_Covered Simulation_EnDt;
if a;
Run;

Data Meth_Cases5(Rename=(Value=COVID_Recovered_EnDt));
Merge Meth_Cases4(in=a) COVID_Recovered(Rename=(Date=Simulation_EnDt));
by Countries_Covered Simulation_EnDt;
if a;
Run;

Data Meth_Cases6(Rename=(Value=COVID_Deaths_EnDt));
Merge Meth_Cases5(in=a) COVID_Deaths(Rename=(Date=Simulation_EnDt));
by Countries_Covered Simulation_EnDt;
if a;
Run;

Data Meth_UsedSt;
Set Meth_Cases6;
Proc Sort;
by Countries_Covered Case_Data_Used_StDt;
Run;

Proc Freq Data=Meth_Cases6;
Run;

Data Meth_Cases7(Rename=(Value=COVID_Cases_Used_StDt));
Merge Meth_UsedSt(in=a) COVID_CASES(Rename=(Date=Case_Data_Used_StDt));
by Countries_Covered Case_Data_Used_StDt;
if a;
Run;

Data Meth_Cases8(Rename=(Value=COVID_Recovered_Used_StDt));
Merge Meth_Cases7(in=a) COVID_Recovered(Rename=(Date=Case_Data_Used_StDt));
by Countries_Covered Case_Data_Used_StDt;
if a;
Run;

Data Meth_Cases9(Rename=(Value=COVID_Deaths_Used_StDt));
Merge Meth_Cases8(in=a) COVID_Deaths(Rename=(Date=Case_Data_Used_StDt));
by Countries_Covered Case_Data_Used_StDt;
if a;
Run;

Data Meth_UsedEnd;
Set Meth_Cases9;
Proc Sort;
by Countries_Covered Case_Data_Used_EnDt;
Run;

Proc Freq Data=Meth_Cases6;
Run;

Data Meth_Cases10(Rename=(Value=COVID_Cases_Used_EnDt));
```

```
Merge Meth_UsedEnd(in=a) COVID_CASES(Rename=(Date=Case_Data_Used_EnDt));
by Countries_Covered Case_Data_Used_EnDt;
if a;
Run;

Data Meth_Cases11(Rename=(Value=COVID_Recovered_Used_EnDt));
Merge Meth_Cases10(in=a) COVID_Recovered(Rename=(Date=Case_Data_Used_EnDt));
by Countries_Covered Case_Data_Used_EnDt;
if a;
Run;

Data CDDEP.CDDEP_Meth_Cases1 (Rename=(Value=COVID_Deaths_Used_EnDt));
Merge Meth_Cases11(in=a) COVID_Deaths(Rename=(Date=Case_Data_Used_EnDt));
by Countries_Covered Case_Data_Used_EnDt;
if a;
Proc Sort;by Countries_Covered;
Run;

Proc Freq Data=COVID_Active_Cases;
Tables Max_Active_Cases;
Run;

****COVID-19 Peak Active Cases and Date for First Wave******;
Data CDDEP.COVID_Active_Cases;
Merge COVID_Cases (Rename=(Value=Cases) In=a) COVID_Recovered(Rename=(Value=Recovered) In=b) COVID_Deaths(Rename=(Value=Deaths
by Countries_Covered Date;
If a and b and c;
Active_Cases=Cases-Recovered-Deaths;
/* Where Date<22311;***less than 2021-01-31; */
Proc Sort; by Countries_Covered Date;
Run;

Proc Freq Data=COVID_Peak_Active_Cases;
Tables Countries_Covered;
Run;

Data CDDEP.COVID_Peak_Active_Cases (Where=(Flag="Yes") Rename=(Date=Peak_Date Active_Cases=Peak_Active_Cases));
Set CDDEP.COVID_Active_Cases;
If Countries_Covered="Algeria" and Date=22120 then Flag="Yes"; ***Date of 2021-01-31-Last simulation date;
If Countries_Covered="Angola" and Date=22236 then Flag="Yes";
If Countries_Covered="Benin" and Date=22099 then Flag="Yes";
If Countries_Covered="Botswana" and Date=22210 then Flag="Yes";
If Countries_Covered="BurkinaFaso" and Date=22019 then Flag="Yes";
If Countries_Covered="Burundi" and Date=22311 then Flag="Yes";***Date of 2021-01-31-Last simulation date;
If Countries_Covered="CaboVerde" and Date=22114 then Flag="Yes";
If Countries_Covered="Cameroon" and Date=22089 then Flag="Yes";
If Countries_Covered="CentralAfricanRepublic" and Date=22107 then Flag="Yes";
If Countries_Covered="Chad" and Date=22059 then Flag="Yes";
If Countries_Covered="Comoros" and Date=22068 then Flag="Yes";
If Countries_Covered="Congo(Brazzaville)" and Date=22160 then Flag="Yes";
If Countries_Covered="Congo(Kinshasa)" and Date=22095 then Flag="Yes";
If Countries_Covered="Coted'Ivoire" and Date=22111 then Flag="Yes";
If Countries_Covered="DemocraticRepublicoftheCongo" and Date=22095 then Flag="Yes";
If Countries_Covered="Djibouti" and Date=22071 then Flag="Yes";
If Countries_Covered="Egypt" and Date=22119 then Flag="Yes";
If Countries_Covered="EquatorialGuinea" and Date=22127 then Flag="Yes";
If Countries_Covered="Eritrea" and Date=22098 then Flag="Yes";
If Countries_Covered="Eswatini" and Date=22140 then Flag="Yes";
If Countries_Covered="Ethiopia" and Date=22201 then Flag="Yes";
If Countries_Covered="Gabon" and Date=22104 then Flag="Yes";
If Countries_Covered="Gambia" and Date=22156 then Flag="Yes";
If Countries_Covered="Ghana" and Date=22085 then Flag="Yes";
If Countries_Covered="Guinea" and Date=22067 then Flag="Yes";
If Countries_Covered="Guinea-Bissau" and Date=22092 then Flag="Yes";
If Countries_Covered="Kenya" and Date=22134 then Flag="Yes";
If Countries_Covered="Lesotho" and Date=22145 then Flag="Yes";
If Countries_Covered="Liberia" and Date=22111 then Flag="Yes";
If Countries_Covered="Libya" and Date=22237 then Flag="Yes";
If Countries_Covered="Madagascar" and Date=22114 then Flag="Yes";
If Countries_Covered="Malawi" and Date=22141 then Flag="Yes";
If Countries_Covered="Mali" and Date=22076 then Flag="Yes";
If Countries_Covered="Mauritania" and Date=22105 then Flag="Yes";
If Countries_Covered="Mauritius" and Date=22015 then Flag="Yes";
If Countries_Covered="Morocco" and Date=22237 then Flag="Yes";
If Countries_Covered="Mozambique" and Date=22190 then Flag="Yes";
If Countries_Covered="Namibia" and Date=22165 then Flag="Yes";
If Countries_Covered="Niger" and Date=22024 then Flag="Yes";
If Countries_Covered="Nigeria" and Date=22128 then Flag="Yes";
If Countries_Covered="Rwanda" and Date=22160 then Flag="Yes";
If Countries_Covered="SaoTomeandPrincipe" and Date=22089 then Flag="Yes";
If Countries_Covered="Senegal" and Date=22149 then Flag="Yes";
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If Countries_Covered="Seychelles" and Date=22107 then Flag="Yes";
If Countries_Covered="SierraLeone" and Date=22084 then Flag="Yes";
If Countries_Covered="Somalia" and Date=22080 then Flag="Yes";
If Countries_Covered="SouthAfrica" and Date=22122 then Flag="Yes";
If Countries_Covered="SouthSudan" and Date=22084 then Flag="Yes";
If Countries_Covered="Sudan" and Date=22086 then Flag="Yes";
If Countries_Covered="Tanzania" and Date=22046 then Flag="Yes";
If Countries_Covered="Togo" and Date=22239 then Flag="Yes";
If Countries_Covered="Tunisia" and Date=22222 then Flag="Yes";
If Countries_Covered="Uganda" and Date=22289 then Flag="Yes";
If Countries_Covered="WesternSahara" and Date=22456 then Flag="Yes";
If Countries_Covered="Zambia" and Date=22121 then Flag="Yes";
If Countries_Covered="Zimbabwe" and Date=22139 then Flag="Yes";
Drop Cases Recovered Deaths;
Proc Sort;by Countries_Covered;
Run;

****COVID-19 First Reported Cases******;
Data CDDEP.COVID_First_Cases (Where=(Flag="Yes") Rename=(Date=First_Reported_Date Cases=First_Cases));
Set CDDEP.COVID_Active_Cases;
If Countries_Covered="Algeria" and Cases>=1 then Flag="Yes"; ***Date of 2021-01-31-Last simulation date;
If Countries_Covered="Angola" and Cases>=1 then Flag="Yes";
If Countries_Covered="Benin" and Cases>=1 then Flag="Yes";
If Countries_Covered="Botswana" and Cases>=1 then Flag="Yes";
If Countries_Covered="BurkinaFaso" and Cases>=1 then Flag="Yes";
If Countries_Covered="Burundi" and Cases>=1 then Flag="Yes";***Date of 2021-01-31-Last simulation date;
If Countries_Covered="CaboVerde" and Cases>=1 then Flag="Yes";
If Countries_Covered="Cameroon" and Cases>=1 then Flag="Yes";
If Countries_Covered="CentralAfricanRepublic" and Cases>=1 then Flag="Yes";
If Countries_Covered="Chad" and Cases>=1 then Flag="Yes";
If Countries_Covered="Comoros" and Cases>=1 then Flag="Yes";
If Countries_Covered="Congo(Brazzaville)" and Cases>=1 then Flag="Yes";
If Countries_Covered="Congo(Kinshasa)" and Cases>=1 then Flag="Yes";
If Countries_Covered="Coted'Ivoire" and Cases>=1 then Flag="Yes";
If Countries_Covered="DemocraticRepublicoftheCongo" and Cases>=1 then Flag="Yes";
If Countries_Covered="Djibouti" and Cases>=1 then Flag="Yes";
If Countries_Covered="Egypt" and Cases>=1 then Flag="Yes";
If Countries_Covered="EquatorialGuinea" and Cases>=1 then Flag="Yes";
If Countries_Covered="Eritrea" and Cases>=1 then Flag="Yes";
If Countries_Covered="Eswatini" and Cases>=1 then Flag="Yes";
If Countries_Covered="Ethiopia" and Cases>=1 then Flag="Yes";
If Countries_Covered="Gabon" and Cases>=1 then Flag="Yes";
If Countries_Covered="Gambia" and Cases>=1 then Flag="Yes";
If Countries_Covered="Ghana" and Cases>=1 then Flag="Yes";
If Countries_Covered="Guinea" and Cases>=1 then Flag="Yes";
If Countries_Covered="Guinea-Bissau" and Cases>=1 then Flag="Yes";
If Countries_Covered="Kenya" and Cases>=1 then Flag="Yes";
If Countries_Covered="Lesotho" and Cases>=1 then Flag="Yes";
If Countries_Covered="Liberia" and Cases>=1 then Flag="Yes";
If Countries_Covered="Libya" and Cases>=1 then Flag="Yes";
If Countries_Covered="Madagascar" and Cases>=1 then Flag="Yes";
If Countries_Covered="Malawi" and Cases>=1 then Flag="Yes";
If Countries_Covered="Mali" and Cases>=1 then Flag="Yes";
If Countries_Covered="Mauritania" and Cases>=1 then Flag="Yes";
If Countries_Covered="Mauritius" and Cases>=1 then Flag="Yes";
If Countries_Covered="Morocco" and Cases>=1 then Flag="Yes";
If Countries_Covered="Mozambique" and Cases>=1 then Flag="Yes";
If Countries_Covered="Namibia" and Cases>=1 then Flag="Yes";
If Countries_Covered="Niger" and Cases>=1 then Flag="Yes";
If Countries_Covered="Nigeria" and Cases>=1 then Flag="Yes";
If Countries_Covered="Rwanda" and Cases>=1 then Flag="Yes";
If Countries_Covered="SaoTomeandPrincipe" and Cases>=1 then Flag="Yes";
If Countries_Covered="Senegal" and Cases>=1 then Flag="Yes";
If Countries_Covered="Seychelles" and Cases>=1 then Flag="Yes";
If Countries_Covered="SierraLeone" and Cases>=1 then Flag="Yes";
If Countries_Covered="Somalia" and Cases>=1 then Flag="Yes";
If Countries_Covered="SouthAfrica" and Cases>=1 then Flag="Yes";
If Countries_Covered="SouthSudan" and Cases>=1 then Flag="Yes";
If Countries_Covered="Sudan" and Cases>=1 then Flag="Yes";
If Countries_Covered="Tanzania" and Cases>=1 then Flag="Yes";
If Countries_Covered="Togo" and Cases>=1 then Flag="Yes";
If Countries_Covered="Tunisia" and Cases>=1 then Flag="Yes";
If Countries_Covered="Uganda" and Cases>=1 then Flag="Yes";
If Countries_Covered="WesternSahara" and Cases>=1 then Flag="Yes";
If Countries_Covered="Zambia" and Cases>=1 then Flag="Yes";
If Countries_Covered="Zimbabwe" and Cases>=1 then Flag="Yes";
Drop Recovered Deaths Active_Cases;
Proc Sort Nodupkey;by Countries_Covered;
Run;

****COVID-19 First Reported Deaths******;
```

```
Data CDDEP.COVID_First_Deaths (Where=(Flag="Yes") Rename=(Date=First_Reported_Death_Date Deaths=First_Deaths));
Set CDDEP.COVID_Active_Cases;
If Countries_Covered="Algeria" and Deaths>=1 then Flag="Yes"; ***Date of 2021-01-31-Last simulation date;
If Countries_Covered="Angola" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Benin" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Botswana" and Deaths>=1 then Flag="Yes";
If Countries_Covered="BurkinaFaso" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Burundi" and Deaths>=1 then Flag="Yes";***Date of 2021-01-31-Last simulation date;
If Countries_Covered="CaboVerde" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Cameroon" and Deaths>=1 then Flag="Yes";
If Countries_Covered="CentralAfricanRepublic" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Chad" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Comoros" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Congo(Brazzaville)" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Congo(Kinshasa)" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Coted'Ivoire" and Deaths>=1 then Flag="Yes";
If Countries_Covered="DemocraticRepublicoftheCongo" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Djibouti" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Egypt" and Deaths>=1 then Flag="Yes";
If Countries_Covered="EquatorialGuinea" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Eritrea" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Eswatini" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Ethiopia" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Gabon" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Gambia" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Ghana" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Guinea" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Guinea-Bissau" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Kenya" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Lesotho" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Liberia" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Libya" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Madagascar" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Malawi" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Mali" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Mauritania" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Mauritius" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Morocco" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Mozambique" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Namibia" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Niger" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Nigeria" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Rwanda" and Deaths>=1 then Flag="Yes";
If Countries_Covered="SaoTomeandPrincipe" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Senegal" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Seychelles" and Deaths>=1 then Flag="Yes";
If Countries_Covered="SierraLeone" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Somalia" and Deaths>=1 then Flag="Yes";
If Countries_Covered="SouthAfrica" and Deaths>=1 then Flag="Yes";
If Countries_Covered="SouthSudan" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Sudan" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Tanzania" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Togo" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Tunisia" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Uganda" and Deaths>=1 then Flag="Yes";
If Countries_Covered="WesternSahara" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Zambia" and Deaths>=1 then Flag="Yes";
If Countries_Covered="Zimbabwe" and Deaths>=1 then Flag="Yes";
Drop Recovered Cases Active_Cases;
Proc Sort Nodupkey;by Countries_Covered;
Run;

Data CDDEP.Active_Cases_Firsts;
Merge CDDEP.COVID_Peak_Active_Cases (In=a) CDDEP.COVID_First_Cases (In=b) CDDEP.COVID_First_Deaths (In=c);
by Countries_Covered;
If a AND b AND c;
Drop Flag;
Run;

Data CDDEP.CDDEP_Meth_Cases2;
Merge CDDEP.CDDEP_Meth_Cases1(In=a) CDDEP.Active_Cases_Firsts (In=b);
by Countries_Covered;
If a;
Proc Sort;by Entry_Number Countries_Covered;
Run;

Proc Freq Data=CDDEP.CDDEP_Meth_Cases2;
Tables Countries_Covered;
Run;

****Merging CDDEP_Meth with Testing Data****;
```

```
***Testing in Simulation period****;
FILENAME Tests '/folders/myfolders/Thabo Mabuka/ARI/CDDEP paper/covid-testing-all-observations.xlsx';

Proc Import Datafile=Tests
    DBMS=XLSX
    Replace
    OUT=CDDEP.COVID_Tests;
    GETNAMES=YES;
RUN;

Proc Contents Data=CDDEP.COVID_Tests;
Run;

Proc Freq Data=COVID_Tests;
Tables Date/Missing;
Run;

Data COVID_Tests (Rename=(Date=Test_Date Cumulative_Total=Cumulative_Tests Cumulative_total_per_thousand=Cumulative_Tests_per_
Set CDDEP.COVID_Tests (Keep=Entity Date Source_URL Source_label Cumulative_total Cumulative_total_per_thousand);
Where Entity in ("Cape Verde - tests performed","Cote d'Ivoire - samples tested","Cote d'Ivoire - samples tested","Ethiopia -
,"Ghana - samples tested","Kenya - samples tested","Libya - samples tested","Madagascar - tests performed"
,"Malawi - samples tested","Mozambique - units unclear","Namibia - samples tested","Nigeria - samples tested"
,"Senegal - tests performed","South Africa - people tested","Togo - tests performed","Djibouti"
,"Tunisia - tests performed","Uganda - samples tested","Zambia - tests performed","Zimbabwe - tests performed");
Countries_Covered=Compress(Tranwrd((Tranwrd((Tranwrd((Tranwrd((Strip(Compress(Entity))),"-testsperformed"," ")),"-samplesteste
If Countries_Covered="CapeVerde" then Countries_Covered="CaboVerde";
Format Date yymmdd10.;
Drop Entity;
Proc Sort; by Countries_Covered Test_Date;
Run;

Data Test_Dates (Rename=Simulation_EnDt=Test_Date);
Set Meth_SimEnd (Keep=Entry_Number Countries_Covered Simulation_EnDt);
Proc Sort; By Countries_Covered Test_Date;
Run;

Data CDDEP.Test_Dates;
Merge Test_Dates(In=a) COVID_Tests(In=b);
by Countries_Covered Test_Date;
If a;
Proc Sort;by Entry_Number Countries_Covered;
Run;

Data CDDEP.CDDEP_Meth_Final;
Merge CDDEP.CDDEP_Meth_Cases2 (In=a) CDDEP.Test_Dates (In=b);
by Entry_Number Countries_Covered;
If a;
Run;
```