Data Fundamentals Lab 4: Calculate Sums, Rates and Percentages in Spreadsheets

In this lab, you will practise basic data analysis in spreadsheets and explore some of the most common calculations used to tell data-driven stories and produce basic analysis of trends. After completing this lab, you will be able to use spreadsheets to:

- Calculate sums
- Calculate rates
- Calculate percentages

Scenario

In this lab, you will use a spreadsheet software (LibreOffice Calc or Microsoft Excel) to analyse a dataset about the Health Workforce in Sub-Saharan Africa (SSA)[1] [2]. This data was downloaded from the [World Health Organisation](). Since the countries in SSA have varying population, you will analyse this data in a way that controls for population size. If we don't control for population, then the biggest country will most likely have the highest number of health workers but that does not mean the everyone has equal access.

NOTE: This data set defines Physicians as "Physician: Includes Doctors, MD Specialist - anesthesiology, MD Specialist - cardiovascular, MD Specialist - urology, MD Specialist - stomatology, MD Specialist - pediatric surgery , MD

---

[1] The criteria for countries was taken from [UNDP Africa]()
[2] The exercise excludes South Sudan because it was not in the dataset.

Specialist - neurosurgery, MD Specialist - ear, nose, throat, MD Specialist - eye, MD Specialist - chest internal medicine, MD Specialist - pediatric dermatology, MD Specialist - obgyne, MD Specialist - orthopedic, MD Specialist - infectious disease, MD Specialist - thoracic, MD Specialist - forensic medical, MD Specialist - tuberculosis, MD Specialist - general surgery, MD Specialist - psychiatry, MD Specialist - radiology, MD Specialist - pediatrics, MD Specialist - neurology, MD Specialist - dermatology, MD Specialist - internal medicine." **Always make sure you read the definitions of the indicators before you start.**

Hypothesis

Access to healthcare is uneven across Sub-Saharan Africa with some having very good access and others very poor access to health workers.

Questions

1. Which country has the best access to doctors, nurses and dentists?
2. Which country has the worst access to doctors, nurses and dentists?
3. Which country meets WHO recommendations for rate of doctors?
4. What is the comparison between access in the best countries and the worst countries?
5. Where do most of the health workers in the region live?

Task 1: Calculating Sums

A basic step for analysing a dataset is to calculate sums. In this task, you will calculate the total number of physicians, nurses and midwives, dentists, and pharmacists in SSA.

To calculate sums, you can use AutoSum (∑) in LibreOffice Calc or Microsoft Excel. Alternatively, you can also use a formula.

Steps

1. Open Global Health Workforce Statistics.xlsx in your spreadsheet software.
2. Analyse the data in the different sheets. See it contains the source, original data, copy working sheet, filter data, and clean data to work on it.
3. SUM FUNCTION
   a. Column D is about the Number of physicians.
   b. Go to cell D48 and type **=SUM(select the cells to SUM, close the parenthesis ad click enter)**.
   c. You can also type **=SUM(D2:D47)** in cell D48. Note that in the formula =SUM(D2:D47), D2 is the first cell and D47 is the last cell in the column to add. The colon (:) tell the spreadsheet software to include all cells between these two cells that you have identified. If you would use a comma (,), the spreadsheet software will include ONLY the two cells identified.

SUM	▾	*f*x ✗ ↵	=SUM(D2:D47)	

	A	B	C	D	E
1	Country	Year	Population	Number of physicians	Number of nursing and midwifery personnel
23	Kenya	2014	46024250	9149	70975
24	Lesotho	2003	1918097	89	1123
25	Liberia	2010	3948125	90	1805
26	Madagascar	2012	22346573	3188	4858
27	Malawi	2009	14714602	265	4812
28	Mali	2010	15075085	1291	6715
29	Mauritania	2009	3506288	445	2303
30	Mauritius	2015	1262605	2550	4261
31	Mozambique	2013	26434372	1452	10620
32	Namibia	2007	2079915	774	5750
33	Niger	2008	15228525	288	2115
34	Nigeria	2008	150347390	56526	224943
35	Rwanda	2015	11629553	742	9661
36	Sao Tome an▸	2004	151969	81	308
37	Senegal	2016	15411614	1066	4822
38	Seychelles	2012	88303	93	419
39	Sierra Leone	2010	6458720	136	1842
40	South Africa	2016	56015473	44949	287458
41	Sudan	2008	32955496	10813	32439
42	Swaziland	2009	1180675	173	1626
43	Togo	2008	6161796	349	1816
44	Uganda	2015	40144870	3645	25305
45	United Repub▸	2014	52234869	1157	21552
46	Zambia	2016	16591390	1514	14807
47	Zimbabwe	2014	15411675	1176	17795
48				=SUM(D2:D47)	

4. Now that you have summed numbers in column D, you also need to sum columns E, F and G. Spreadsheet softwares are smart. You don't have to type the formula in for each column. Instead, hover over the bottom right corner of cell D48 until a black or white plus appears. Click and hold, dragging across the columns in row 48.

	Country	Year	Population	Number of physicians	Number of nursing and midwifery personnel	Number of dentistry personnel	Number of pharmaceutical personnel
23	Kenya	2014	46024250	9149	70975	1090	2355
24	Lesotho	2003	1918097	89	1123	16	62
25	Liberia	2010	3948125	90	1805	23	46
26	Madagascar	2012	22346573	3188	4858	181	6
27	Malawi	2009	14714602	265	4812	180	221
28	Mali	2010	15075085	1291	6715	103	135
29	Mauritania	2009	3506288	445	2303	93	123
30	Mauritius	2015	1262605	2550	4261	380	497
31	Mozambique	2013	26434372	1452	10620	418	1491
32	Namibia	2007	2079915	774	5750	90	376
33	Niger	2008	15228525	288	2115	16	21
34	Nigeria	2008	150347390	56526	224943	3781	18682
35	Rwanda	2015	11629553	742	9661	127	114
36	Sao Tome an	2004	151969	81	308	11	24
37	Senegal	2016	15411614	1066	4822	178	170
38	Seychelles	2012	88303	93	419	14	4
39	Sierra Leone	2010	6458720	136	1842	6	113
40	South Africa	2016	56015473	44949	287458	11817	36980
41	Sudan	2008	32955496	10813	32439	772	386
42	Swaziland	2009	1180675	173	1626	59	51
43	Togo	2008	6161796	349	1816	19	11
44	Uganda	2015	40144870	3645	25305	276	45
45	United Repub	2014	52234869	1157	21552	1037	1839
46	Zambia	2016	16591390	1514	14807	312	1159
47	Zimbabwe	2014	15411675	1176	17795	250	392
48				165567	955245	22386	73117

5. Finally name row 48 as TOTAL. In order to remove any errors when sorting the data, it is better to separate the TOTAL from the other rows. We can do this by moving to row 50 and repeating the SUM formula above.

	Country	Year	Population	Number of physicians	Number of nursing and midwifery personnel	Number of dentistry personnel	Number of pharmaceutical personnel
26	Madagascar	2012	22346573	3188	4858	181	6
27	Malawi	2009	14714602	265	4812	180	221
28	Mali	2010	15075085	1291	6715	103	135
29	Mauritania	2009	3506288	445	2303	93	123
30	Mauritius	2015	1262605	2550	4261	380	497
31	Mozambique	2013	26434372	1452	10620	418	1491
32	Namibia	2007	2079915	774	5750	90	376
33	Niger	2008	15228525	288	2115	16	21
34	Nigeria	2008	150347390	56526	224943	3781	18682
35	Rwanda	2015	11629553	742	9661	127	114
36	Sao Tome and Principe	2004	151969	81	308	11	24
37	Senegal	2016	15411614	1066	4822	178	170
38	Seychelles	2012	88303	93	419	14	4
39	Sierra Leone	2010	6458720	136	1842	6	113
40	South Africa	2016	56015473	44949	287458	11817	36980
41	Sudan	2008	32955496	10813	32439	772	386
42	Swaziland	2009	1180675	173	1626	59	51
43	Togo	2008	6161796	349	1816	19	11
44	Uganda	2015	40144870	3645	25305	276	45
45	United Republic of Tanzania	2014	52234869	1157	21552	1037	1839
46	Zambia	2016	16591390	1514	14807	312	1159
47	Zimbabwe	2014	15411675	1176	17795	250	392
48							
49							
50	TOTAL		868460150	165567	955245	22386	73117

Task 2: Calculating Rates

Can you compare two countries - one where population is very large and another where the population is small - just by looking at the totals? Often, the most logical way to compare numbers is through rates. For example, maternal deaths per 1,000 live births.

In this task, we want to calculate the rate of Number of physicians per 100,000 across the countries in Sub-Saharan Africa.

1. In Cell H1, enter the column label Groups of 100,000

2. In column H, you want to calculate how many groups of 100,000 there are in each region. This means you simply need to divide the population of all regions by 100,000. In cell H2, type **=C2/100000** and press **Enter**.

	A	B	C	D	E	F	G	H
1	Country	Year	Population	Number of physicians	Number of nursing and midwifery personnel	Number of dentistry personnel	Number of pharmaceutical personnel	Groups of 100,000
2	Angola	2004	18865716	1165	18485	222	919	=C2/100000
3	Benin	2016	10872298	1709	6681	9	13	
4	Botswana	2009	1979882	693	5816	145	365	
5	Burkina Faso	2012	16571216	787	10459	38	351	
6	Burundi	2004	7182451	200	1348	14	76	
7	Cabo Verde	2011	508067	292	543	3	5	
8	Cameroon	2010	19970495	1712	10714	58	42	
9	Central African Republic	2009	4404230	205	1097	12	12	
10	Chad	2013	13133589	573	4057		72	
11	Comoros	2004	597228	115	588	29	41	
12	Congo	2007	3976246	401	3492		63	
13	Côte d'Ivoire	2008	19497986	2746	9231	274	413	
14	Democratic Republic of the Congo	2009	62409435	5832	61368	79	495	
15	Equatorial Guinea	2004	724817	153	271	15	121	
16	Eritrea	2004	3858623	215	2505	16	107	
17	Ethiopia	2009	85416253	2152	21488		2661	
18	Gabon	2016	1979786	715	5109	42	118	
19	Gambia	2015	1977590	213	3222	20	104	
20	Ghana	2008	23298640	2587	22834	148	1673	
21	Guinea	2016	12395924	977	4765		142	
22	Guinea-Bissau	2009	1517448	124	1042	13	21	
23	Kenya	2014	46024250	9149	70975	1090	2355	
24	Lesotho	2003	1918097	89	1123	16	62	

3. Next hover over the bottom right corner of cell H2 until a black or white plus appears. Click and hold, dragging across the rows in column H.

7

	A	B	C	D	E	F	G	H
1	Country	Year	Population	Number of physicians	Number of nursing and midwifery personnel	Number of dentistry personnel	Number of pharmaceutical personnel	Groups of 100,000
2	Angola	2004	18865716	1165	18485	222	919	188.65716
3	Benin	2016	10872298	1709	6681	9	13	108.72298
4	Botswana	2009	1979882	693	5816	145	365	19.79882
5	Burkina Faso	2012	16571216	787	10459	38	351	165.71216
6	Burundi	2004	7182451	200	1348	14	76	71.82451
7	Cabo Verde	2011	508067	292	543	3	5	5.08067
8	Cameroon	2010	19970495	1712	10714	58	42	199.70495
9	Central African Republic	2009	4404230	205	1097	12	12	44.0423
10	Chad	2013	13133589	573	4057		72	131.33589
11	Comoros	2004	597228	115	588	29	41	5.97228
12	Congo	2007	3976246	401	3492		63	39.76246
13	Côte d'Ivoire	2008	19497986	2746	9231	274	413	194.97986
14	Democratic Republic of the Congo	2009	62409435	5832	61368	79	495	624.09435
15	Equatorial Guinea	2004	724817	153	271	15	121	7.24817
16	Eritrea	2004	3858623	215	2505	16	107	38.58623
17	Ethiopia	2009	85416253	2152	21488		2661	854.16253
18	Gabon	2016	1979786	715	5109	42	118	19.79786
19	Gambia	2015	1977590	213	3222	20	104	19.7759
20	Ghana	2008	23298640	2587	22834	148	1673	232.9864
21	Guinea	2016	12395924	977	4765		142	123.95924
22	Guinea-Bissau	2009	1517448	124	1042	13	21	15.17448
23	Kenya	2014	46024250	9149	70975	1090	2355	460.2425
24	Lesotho	2003	1918097	89	1123	16	62	19.18097
25	Liberia	2010	3948125	90	1805	23	46	39.48125
26	Madagascar	2012	22346573	3188	4858	181	6	223.46573
27	Malawi	2009	14714602	265	4812	180	221	147.14602
28	Mali	2010	15075085	1291	6715	103	135	150.75085
29	Mauritania	2009	3506288	445	2303	93	123	35.06288
30	Mauritius	2015	1262605	2550	4261	380	497	12.62605
31	Mozambique	2013	26434372	1452	10620	418	1491	264.34372
32	Namibia	2007	2079915	774	5750	90	376	20.79915
33	Niger	2008	15228525	288	2115	16	21	152.28525
34	Nigeria	2008	150347390	56526	224943	3781	18682	1503.4739
35	Rwanda	2015	11629553	742	9661	127	114	116.29553
36	Sao Tome and Principe	2004	151969	81	308	11	24	1.51969
37	Senegal	2016	15411614	1066	4822	178	170	154.11614

4. Next, in cell I1 – add a column label called **Physicians per 100,000**.

5. To calculate this rate in column I, simply divide the total number of "Physicians" (column D) by "Groups of 100,000" (column H). In cell I2, type **=D2/H2** and press **Enter**.

	A	B	C	D	E	F	G	H	I
1	Country	Year	Population	Number of physicians	Number of nursing and midwifery personnel	Number of dentistry personnel	Number of pharmaceutical personnel	Groups of 100,000	Physicians per 100,000
2	Angola	2004	18865716	1165	18485	222	919	188.65716	=D2/H2
3	Benin	2016	10872298	1709	6681	9	13	108.72298	
4	Botswana	2009	1979882	693	5816	145	365	19.79882	
5	Burkina Faso	2012	16571216	787	10459	38	351	165.71216	
6	Burundi	2004	7182451	200	1348	14	76	71.82451	
7	Cabo Verde	2011	508067	292	543	3	5	5.08067	
8	Cameroon	2010	19970495	1712	10714	58	42	199.70495	
9	Central African Republic	2009	4404230	205	1097	12	12	44.0423	
10	Chad	2013	13133589	573	4057		72	131.33589	
11	Comoros	2004	597228	115	588	29	41	5.97228	
12	Congo	2007	3976246	401	3492		63	39.76246	
13	Côte d'Ivoire	2008	19497986	2746	9231	274	413	194.97986	
14	Democratic Republic of the Congo	2009	62409435	5832	61368	79	495	624.09435	
15	Equatorial Guinea	2004	724817	153	271	15	121	7.24817	
16	Eritrea	2004	3858623	215	2505	16	107	38.58623	
17	Ethiopia	2009	85416253	2152	21488		2661	854.16253	
18	Gabon	2016	1979786	715	5109	42	118	19.79786	
19	Gambia	2015	1977590	213	3222	20	104	19.7759	
20	Ghana	2008	23298640	2587	22834	148	1673	232.9864	
21	Guinea	2016	12395924	977	4765		142	123.95924	
22	Guinea-Bissau	2009	1517448	124	1042	13	21	15.17448	
23	Kenya	2014	46024250	9149	70975	1090	2355	460.2425	
24	Lesotho	2003	1918097	89	1123	16	62	19.18097	
25	Liberia	2010	3948125	90	1805	23	46	39.48125	
26	Madagascar	2012	22346573	3188	4858	181	6	223.46573	

6. Next, hover over the bottom right corner of cell I2 until a black or white plus appears. Click and hold, dragging across the rows in column I.

	A	B	C	D	E	F	G	H	I
1	Country	Year	Population	Number of physicians	Number of nursing and midwifery personnel	Number of dentistry personnel	Number of pharmaceutical personnel	Groups of 100,000	Physicians per 100,000
2	Angola	2004	18865716	1165	18485	222	919	188.65716	6.1752228222
3	Benin	2016	10872298	1709	6681	9	13	108.72298	15.7188480301
4	Botswana	2009	1979882	693	5816	145	365	19.79882	35.0020859829
5	Burkina Faso	2012	16571216	787	10459	38	351	165.71216	4.7491988518
6	Burundi	2004	7182451	200	1348	14	76	71.82451	2.7845647677
7	Cabo Verde	2011	508067	292	543	3	5	5.08067	57.4727348952
8	Cameroon	2010	19970495	1712	10714	58	42	199.70495	8.5726467972
9	Central African Republic	2009	4404230	205	1097	12	12	44.0423	4.6546161304
10	Chad	2013	13133589	573	4057		72	131.33589	4.3628592306
11	Comoros	2004	597228	115	588	29	41	5.97228	19.2556276665
12	Congo	2007	3976246	401	3492		63	39.76246	10.084889114
13	Côte d'Ivoire	2008	19497986	2746	9231	274	413	194.97986	14.0835058554
14	Democratic Republic of the Congo	2009	62409435	5832	61368	79	495	624.09435	9.3447409034
15	Equatorial Guinea	2004	724817	153	271	15	121	7.24817	21.1087764222
16	Eritrea	2004	3858623	215	2505	16	107	38.58623	5.5719358953
17	Ethiopia	2009	85416253	2152	21488		2661	854.16253	2.5194268355
18	Gabon	2016	1979786	715	5109	42	118	19.79786	36.1150144511
19	Gambia	2015	1977590	213	3222	20	104	19.7759	10.7706855314
20	Ghana	2008	23298640	2587	22834	148	1673	232.9864	11.103652402
21	Guinea	2016	12395924	977	4765		142	123.95924	7.8816230238
22	Guinea-Bissau	2009	1517448	124	1042	13	21	15.17448	8.1716144474
23	Kenya	2014	46024250	9149	70975	1090	2355	460.2425	19.8786509286
24	Lesotho	2003	1918097	89	1123	16	62	19.18097	4.6400155988
25	Liberia	2010	3948125	90	1805	23	46	39.48125	2.2795630837
26	Madagascar	2012	22346573	3188	4858	181	6	223.46573	14.2661695822

7. Repeat step 3, 4, 5 with Nurses and Midwives, Dentists and Pharmacists.

Country	Groups of 100,000	Physicians per 100,000	Nurses and Midwives per 100,000	Dentists per 100,000	Pharmacists per 100,000
Angola	188.65716	6.1752228222	97.9819689854	1.1767377395	4.8712701919
Benin	108.72298	15.7188480301	61.4497505495	0.082779188	0.1195699382
Botswana	19.79882	35.0020859829	293.754880341	7.3236687843	18.4354421122
Burkina Faso	165.71216	4.7491988518	63.1154647915	0.2293132864	2.1181306188
Burundi	71.82451	2.7845647677	18.767966534	0.1949195337	1.0581346117
Cabo Verde	5.08067	57.4727348952	106.875667973	0.5904733037	0.9841221729
Cameroon	199.70495	8.5726467972	53.6491459025	0.2904284546	0.2103102602
Central African Republic	44.0423	4.6546161304	24.9078726588	0.2724653345	0.2724653345
Chad	131.33589	4.3628592306	30.8902616033	0	0.5482126782
Comoros	5.97228	19.2556276665	98.4548614599	4.8557669768	6.8650498637
Congo	39.76246	10.084889114	87.8215281449	0	1.5844090129
Côte d'Ivoire	194.97986	14.0835058554	47.3433512569	1.4052733446	2.1181674866
Democratic Republic of the Congo	624.09435	9.3447409034	98.3312859666	0.1265834244	0.7931493051
Equatorial Guinea	7.24817	21.1087764222	37.3887477805	2.0694878845	16.6938689352
Eritrea	38.58623	5.5719358953	64.9195321751	0.4146556945	2.7730099572
Ethiopia	854.16253	2.5194268355	25.1568047594	0	3.1153321605
Gabon	19.79786	36.1150144511	258.058194168	2.1214414083	5.9602401472
Gambia	19.7759	10.7706855314	162.925581137	1.0113319748	5.2589262688
Ghana	232.9864	11.103652402	98.0057205056	0.6352302109	7.1806766404
Guinea	123.95924	7.8816230238	38.4400549729	0	1.1455378397
Guinea-Bissau	15.17448	8.1716144474	68.6679214049	0.8567015146	1.3839024467
Kenya	460.2425	19.8786509286	154.212181622	2.3683167026	5.1168677382
Lesotho	19.18097	4.6400155988	58.5476125556	0.8341601076	3.2323704171
Liberia	39.48125	2.2795630837	45.7179040684	0.5825550103	1.1651100206
Madagascar	223.46573	14.2661695822	21.7393512643	0.8099675955	0.0268497545
Malawi	147.14602	1.8009321625	32.7022096826	1.2232746764	1.5019094638
Mali	150.75085	8.5637991428	44.5436957735	0.6832465621	0.8955173387
Mauritania	35.06288	12.6914845557	65.6819975997	2.6523776712	3.5079833716
Mauritius	12.62605	201.963401064	337.476883111	30.0965068252	39.363062874
Mozambique	264.34372	5.4928484777	40.1749661388	1.5812745618	5.6403836641
Namibia	20.79915	37.2130591875	276.453605075	4.3270999055	18.0776618275

8. Now, we know which countries have the best and the worst access to doctors. But the important question for the public is how many doctors is "enough" for a population? Use your research skills to find out how many doctors the World Health Organisation recommends per 100,000. How many countries meet that minimum?

Using Ratios

In order to make the comparisons easier to communicate, you can use a ratio.

Say you want the public to compare the number of nurses and midwives in the countries that has the highest rate, South Africa (**513**) and the least, Niger (**13.9**).

Will it be simple for your audience to understand the comparison between these two numbers: **60.0** and **26.7**? You can calculate ratios to make this simple.

9. First, round up Niger (13.9) to 14.

10. Simplify the numbers by divide both numbers by the smallest number (**14**).

11. Now we get South Africa **=36.6** and Niger = **1.** Hence we can safely say:
    "For every 36 nurses and midwives in South Africa, there is only 1 in Niger."

Task 3: Calculating Percentages

Percentages can be useful for determining how big a number really is by looking at it as part of the whole.

Let's figure out what percentage of total Physicians in the region live in Tanzania. In other words, you need to divide Physicians in Tanzania (value in cell D45) by Total of Physicians in Sub-Saharan Africa (value in cell D50). To do this in LibreOffice Calc or Microsoft Excel:

12. In cell M1, add a label called **Percentage of Physicians**.

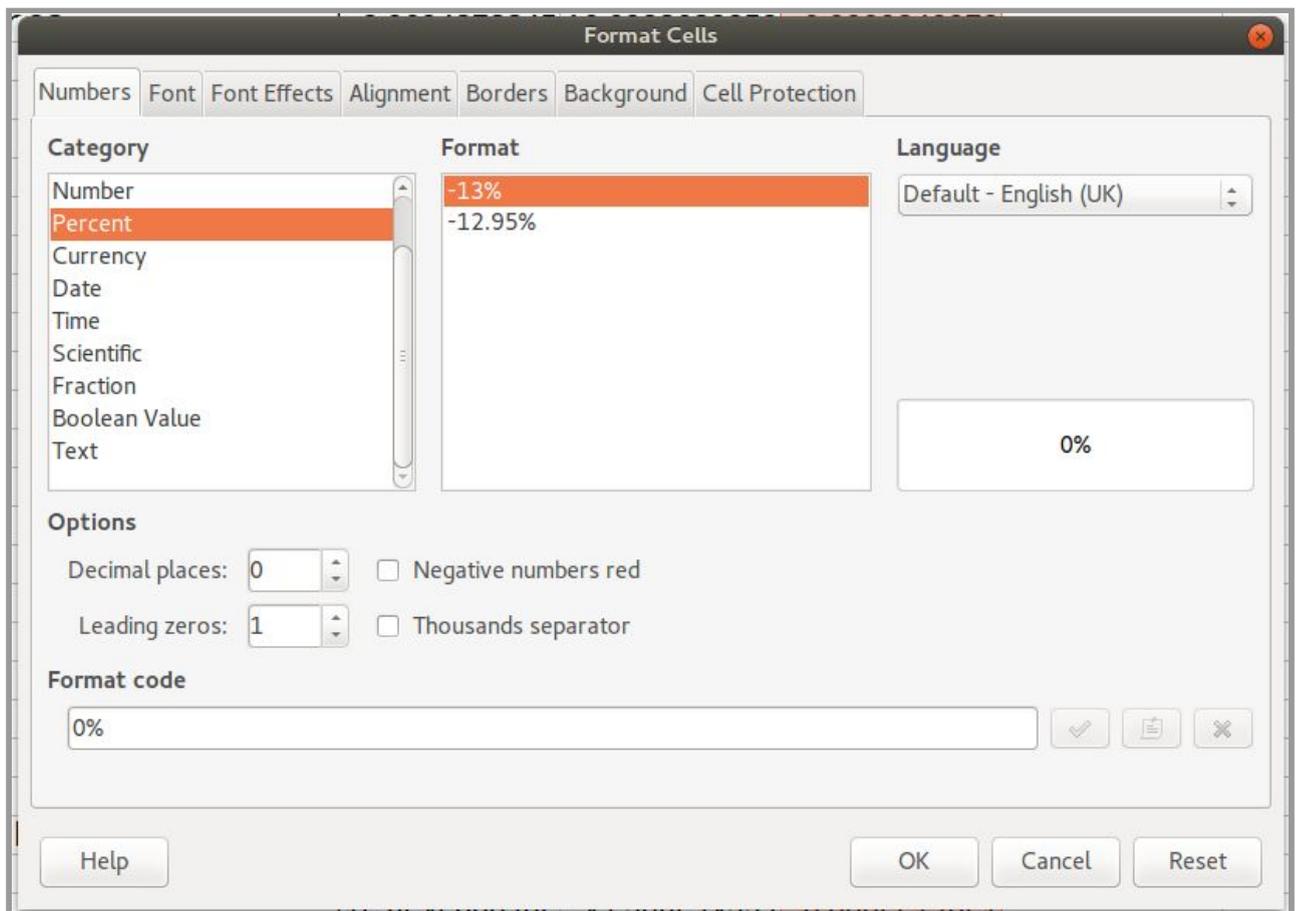13. In cell M2, enter the formula **=D2/$D$50** and press **Enter**.

14. Why did we use **$D$50** instead of **D50** like in the previous tasks? Because to copy this formula down the column by dragging it, you need to first ensure that the denominator value (in cell D50) which represents the total of Physician in Sub-Saharan remains the same in each calculation. If you don't lock this value, the calculation won't work because the formula will automatically jump the denominator down one cell. Therefore, to lock the

denominator, you type **$** before **D** and before **50**. So it should look like **=D2/$D$50**.

15. Next, hover over the bottom right corner of cell M2 until a black or white plus appears. Click and hold, dragging across the rows in column M.

16. Now select the values in column M and right click, and then select **Format Cells**.

17. Next from the menu on the left, select **Percentage** and then click **OK**.

18. You can now see that 0.70% of Sub-Saharan Africa Physicians live in Tanzania.

	Country	Physicians per 100,000	Nurses and Midwives per 100,000	Dentists per 100,000	Pharmacists per 100,000	Percentage of Physicians
17	Ethiopia	2.5194268355	25.1568047594	0	3.1153321605	1.30%
18	Gabon	36.1150144511	258.0581941685	2.1214414083	5.9602401472	0.43%
19	Gambia	10.7706855314	162.9255811366	1.0113319748	5.2589262688	0.13%
20	Ghana	11.103652402	98.0057205056	0.6352302109	7.1806766404	1.56%
21	Guinea	7.8816230238	38.4400549729	0	1.1455378397	0.59%
22	Guinea-Bissau	8.1716144474	68.6679214049	0.8567015146	1.3839024467	0.07%
23	Kenya	19.8786509286	154.2121816216	2.3683167026	5.1168677382	5.53%
24	Lesotho	4.6400155988	58.5476125556	0.8341601076	3.2323704171	0.05%
25	Liberia	2.2795630837	45.7179040684	0.5825550103	1.1651100206	0.05%
26	Madagascar	14.2661695822	21.7393512643	0.8099675955	0.0268497545	1.93%
27	Malawi	1.8009321625	32.7022096826	1.2232746764	1.5019094638	0.16%
28	Mali	8.5637991428	44.5436957735	0.6832465621	0.8955173387	0.78%
29	Mauritania	12.6914845557	65.6819975997	2.6523776712	3.5079833716	0.27%
30	Mauritius	201.9634010637	337.4768831107	30.0965068252	39.363062874	1.54%
31	Mozambique	5.4928484777	40.1749661388	1.5812745618	5.6403836641	0.88%
32	Namibia	37.2130591875	276.4536050752	4.3270999055	18.0776618275	0.47%
33	Niger	1.8911877546	13.8884100725	0.1050659864	0.1378991071	0.17%
34	Nigeria	37.5969280212	149.6155004753	2.5148424592	12.4258891358	34.14%
35	Rwanda	6.3802968179	83.0728403749	1.0920454122	0.9802612362	0.45%
36	Sao Tome and Principe	53.3003441491	202.6729135547	7.2383183412	15.7926945627	0.05%
37	Senegal	6.9168615305	31.2880922141	1.1549731261	1.1030642216	0.64%
38	Seychelles	105.3191850787	474.5025650318	15.8545009796	4.5298574227	0.06%
39	Sierra Leone	2.1056803825	28.5195828276	0.0928976639	1.7495726707	0.08%
40	South Africa	80.2438997525	513.1760647634	21.0959568261	66.017473422	27.15%
41	Sudan	32.8109156664	98.4327469992	2.3425531207	1.1712765604	6.53%
42	Swaziland	14.6526351452	137.7178309018	4.9971414657	4.3195629619	0.10%
43	Togo	5.6639330481	29.4719266915	0.3083516559	0.1785193797	0.21%
44	Uganda	9.0796159011	63.0342058649	0.6875100106	0.1120940235	2.20%
45	United Republic of Tanzania	2.2149955042	41.2597952529	1.9852639048	3.5206367609	0.70%
46	Zambia	9.1252149458	89.245084348	1.8804934367	6.9855509394	0.91%
47	Zimbabwe	7.6305787658	115.4644125314	1.6221468465	2.5435262553	0.71%

19. Do percentage calculation for Nurses and Midwives, Dentists and Pharmacists.