Tutorial 2: Problems On Fertility Measures

1. Population of Scotland on 30 June in various years
   i) Calculate crude birth rates

Year	Total Pop (000)	F. Pop (000)	Birth	CBR (B/P)	GFR (B/w)
1971	5236	1011	86700	0.0166	0.08576
1981	5180	1094	69100	0.0133	0.0632
1991	5107	1122	67000	0.0131	0.05971
1993	5121	1103	63300	0.0124	0.05739
1994	5132	1102	61700	0.0120	0.05599
1995	5136	1101	60100	0.0117	0.05457

~~There is a higher birth rate per woman than males~~

2. Mortality rate for women is high compared to men

3. Table 2, Relate to fertility in England and Wales in 1976 and 1993

	1976			1993		
Age	Births (000s)	F. Pop (W_i) (000s)	f_i	Births (000's)	F. Pop W_i (000's)	f_i
15-19	57.9	1809	0.03201	45.1	1455	0.031
20-24	182.2	1672	0.10897	152.0	1831	0.0830
25-29	220.7	1855	0.11898	236.0	2070	0.1140
30-34	90.8	1593	0.0570	171.1	1967	0.0870
35-39	26.1	1379	0.01893	58.8	1729	0.034
40-44	6.5	1300	0.005	10.5	1750	0.006
Total	584.2	9608	0.34089	673.5	10802	0.355

a) Calculate the GFR for 1976 and 1993

$GFR = \frac{\sum f_i W_i}{W} = 0.0608 \Rightarrow 1976$

$= 0.0608 \times 1000 = 60.8$ live births per 1000 women in their reproductive ages (15-44) yrs.

$GFR(1993) = \frac{\sum f_i W_i}{W} = 0.0623 \times 1000 = 62.3$ live births per 1000 women in their reproductive ages (15-44) yrs

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b) $ASFR_s(1976) = 0.34089$

$ASFR_s(1993) = 0.355$

c) Using the 1976 population as the standard, calculate a standardized fertility Rate for 1993.

$$\text{Standardized fertility Rate} = \frac{\sum f_{i(1993)} * W_{i(1976)}}{\sum W_{i(1976)}}$$

Age	$W_{i(1976)}$	$f_{i(1993)}$	$f_{i(1993)} * W_{i(1976)}$
15-19	1809	0.031	56.079
20-24	1672	0.0830	138.776
25-29	1855	0.1140	211.47
30-34	1543	0.0870	138.591
35-39	1379	0.034	46.886
40-44	1300	0.006	7.8
Total	9608		599.602

$$\therefore SFR = \frac{\sum f_{i(1993)} * W_{i(1976)}}{\sum W_{i(1976)}} = \frac{599.602}{9608} = 0.0624 \times 1000$$

$\simeq$ 62. live births per 1000 women in their reproductive ages (15-44) yrs.

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Egypt, 1988

Age	W(000)	Births(000's)	ASFR(f_i)
15-19	2076.19	43.6	0.021
20-24	2076.29	402.8	0.194
25-29	1826.18	578.9	0.317
30-34	1499.63	403.4	0.269
35-39	1269.11	242.4	0.191
40-44	1064.38	77.7	0.073
45-49	965.38	25.1	0.026
	10777.16	1773.9	1.091

Tunisia, 1989

Births(000's)	ASFR	W(000)
6.3	0.017	370.588
43.6	0.131	332.824
55.7	0.195	285.641
41.1	0.176	233.523
21.6	0.113	191.15
5.7	0.041	139.025
1.1	0.009	122.223
175.1	0.682	1674.974

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GFR

a) Egypt

$$GFR = \frac{B}{W} = \frac{\sum f_i W_i}{W} = 0.1646 * 1000 = (164.6)$$

$\therefore \cong$ 164 live births per 1000 women in their reproductive ages (15-49) yrs.

b Tunisia:

$$GFR = \frac{175.1}{1674.974} = 0.1045 \times 1000 = (104.5 \text{ live births per 1000 women in their reproductive ages (15-49) yrs}$$

b) $SFR_{(T)}$

Age	$W_{i(Egypt)}$ 000's	ASFR($f_{i(Tunisia)}$)	$f_{i(Tunisia)} * W_{i(Egypt)}$
15-19	2076.19	0.017	35.295
2024	2076.29	0.131	271.994
25-29	1826.18	0.195	356.1051
30-34	1499.63	0.176	263.935
35-39	1269.11	0.113	143.4094
40-44	1064.38	0.041	43.640
45-49	965.38	0.009	8.68842
Total	10777.16		1123.06692

$$GFR(SFR_{(T)}) = \frac{\sum f_{i(Tunisia)} * W_{i(Egypt)}}{W_{(Egypt)}}$$

$$= \frac{1123.06692}{10777.16} = 0.1042 * 1000$$

= 104 live births per 1000 women in their reproductive ages (15-49) yrs

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TFR_c.

e) Calculate for Egypt and Tunisia:

i) Egypt:

$$n = 5$$

$$TFR_E = n\sum f_i = 5 * 1.091$$
$$= 5.455$$
$$\simeq 5$$

ii) Tunisia

$$TFR_T = n\sum f_i = 5 \times 0.682$$
$$= 3.41$$
$$\simeq 3$$

5 Table 4.

Age group	W_i(urban)	W_i(rural)	f_i(urban)	f_i(rural)	$f_i W_i$(urban)	$f_i W_i$(rural)
15-19	129.398	928.692	0.135	0.165	17.468	163.134
20-24	134.7	820.404	0.268	0.291	36.099	238.737
25-29	120.06	662.634	0.242	0.273	29.054	180.899
30-34	84.42	557.454	0.210	0.261	17.728	145.495
35-39	62.698	462.752	0.149	0.20	9.342	92.558
40-44	40.02	462.792	0.086	0.123	3.441	56.923
45-49	25.346	326.058	0.012	0.062	0.304	20.215
Total	596.642	4280.826	1.102	1.375	113.436	897.961

a) i) $GFR_{s\,(URBAN)} = \frac{\sum f_i W_i}{W} = \frac{113.436}{596.642} = 0.19012 * 1000 = 190.12$

$\simeq$ 190 live births per 1000 women in their reproductive ages $(15-49)_{yrs}$.

ii) $GFR_{s\,(RURAL)} = \frac{\sum f_i W_i}{W} = \frac{897.961}{4280.826} = 0.20976 * 1000 = 209.76$

$\simeq$ 209 live births per 1000 women in their reproductive ages $(15-49)_{yrs}$.

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b) Calculate TFRs for urban and rural areas

$TFR_{s\,(URBAN)} = \Lambda \Sigma f_i$

$= 5 * 1.102$

$\simeq 5$

$TFR_{s\,(RURAL)} = \Lambda \Sigma f_i$

$= 5 \times 1.375$

$\simeq 6$

c) Standardized Fertility Rates for urban areas, using the rural area as the standard.

$$SFR = \frac{\sum f_{i\,(URBAN)} * W_{i\,(RURAL)}}{W_{(RURAL)}}$$

Age	$W_{i\,(RURAL)}$	$f_{i\,(URBAN)}$	$f_{i\,(URBAN)} * W_{i\,(RURAL)}$
15-19	988.692	0.135	133.38
20-24	820.404	0.268	219.868
25-29	662.634	0.242	160.357
30-34	557.454	0.210	117.065
35-39	462.792	0.149	68.956
40-44	462.792	0.086	39.800
45-49	326.058	0.012	3.912
Total	4280.826		743.338

$$SFR = \frac{\sum f_{i\,(URBAN)} * W_{i\,(RURAL)}}{W_{(RURAL)}}$$

$$= \frac{743.338}{4280.826} = 0.17364$$

$= 0.17364 * 1000 = 173.64$

$\simeq 173$ live births per 1000 women in their reproductive ages (15-49) yrs

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d) What do your results tell about fertility in Malawi?

⇒ fertility rate in Malawi is higher in rural areas among rural women compared to urban women.

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