

UNIVERSITY OF SWAZILAND

DEPARTMENT OF STATISTICS AND DEMOGRAPHY

FINAL EXAMINATION 2017

TITLE OF PAPER : INDIRECT TECHNIQUES OF DEMOGRAPHIC
ESTIMATION I

COURSE CODE : DEM 313

TIME ALLOWED : TWO (2) HOURS

INSTRUCTIONS : ANSWER THREE QUESTIONS.

: SHOW ALL YOUR FORMULAE AND WORKINGS.

REQUIREMENTS : CALCULATOR

THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN
GRANTED BY THE INVIGILATOR

Question 1 (COMPULSORY)

[25 Marks]

- a. What is meant by the term “indirect” demographic estimation? [2]
- b. State and explain three (3) reasons on the need for indirect demographic estimation techniques. [9]
- c. Before a detailed analysis is done demographers tend to do a preliminary check or analysis of data quality. Using data for a certain country an el-Badry correction technique was applied. Based on this information:
 - i. What does the el-Badry correction technique do? [4]
 - ii. What is the required data for the el-Badry technique? [3]
 - iii. State one assumption of the technique applied; [3]
 - iv. State two (2) reasons that could have justified the demographer’s use of the el-Badry technique on the observed data? [4]

Question 2 (COMPULSORY)

[25 Marks]

Census data in Table E2 was obtained on children ever born and births in the last 12 months for women in country X in 2002. Based on these data, an attempt was made to estimate fertility using the Trussell variant of Brass P/F ratio method. The results are presented in Table E2 using standard symbols (in Manual X of United Nations). You may use in your calculations the relevant formulae and Table A1 coefficients in the appendix. The reported population for country X was 71,315,944.

Table E2

i	Age group	W(i)	CEB(i)	B(i)	P(i)	f(i)	$\Phi(i)$	F(i)	w(i)	f+(i)	P(i)/F(i)	f*(i)
1	15-19	3014706	1160919	320406	-----	-----	0.5314	0.237	0.087	0.1262	-----	-----
2	20-24	2653155	4901382	609269	-----	-----	-----	-----	-----	-----	-----	-----
3	25-29	2607009	9085852	561494	-----	-----	-----	-----	-----	-----	-----	-----
4	30-34	2015663	9910256	367833	-----	-----	-----	3.323	-----	-----	-----	-----
5	35-39	1771680	10384001	237297	-----	-----	-----	4.094	0.205	0.1310	-----	-----
6	40-44	1479575	9164329	95357	-----	-----	-----	4.579	0.167	0.0568	-----	-----
7	45-49	1135129	6905673	38125	-----	-----	4.8288	4.790	-----	0.0280	-----	-----

- a) Calculate the values for columns P(i) to f+(i) in Table E2 as indicated by the blank spaces. [10]
- b) Calculate P/F ratios for all age groups. [2]
- c) Interpret the meaning of the P/F ratios you obtained above. [2]
- d) Based on the values you obtained in (b), calculate the adjustment factor, k and give a reason on the method you have chosen. [2]
- e) Calculate the adjusted fertility rate, f*(i). [2]
- f) Using the results obtained above and data in Table E2, estimate the reported and adjusted total fertility rate for country X, and compare the results. [3]
- g) State your assumptions for using the Brass P/F ratio method to estimate fertility. [4]

ANSWER EITHER

Question 3

[25 marks]

- a. Explain the meaning and purpose of demographic models of fertility? [5]
- b. State four (4) desirable properties of fertility models. [4]
- c. Write critical, but brief notes explaining the rationale for using the Coale's indices of marital and ex-nuptial fertility [5]
- d. The Coale and Trussell (1974) fertility model is expressed in the form:

$$r(a)/n(a) = M.e^{m.v(a)}$$

- i. For the purpose of fitting m and M parameters, transform the above equation into a linear regression equation by taking natural logarithms. [2]
 - ii. Explain the meaning of parameter $v(a)$ in the model. [2]
- e. Suppose the linear equation you obtained above is fitted to data using a least-squares method to fit this line and the value of the intercept is -0.892 while that of slope is 1.703;
 - i. what are the corresponding values of m and M? [3]
 - ii. what are the meaning of m and M values obtained above? [4]

OR

Question 4

[25 Marks]

- a. Describe the rationale of Relational Gompertz Model of fertility schedule. [5]
- b. Why is this method relational? [2]
- c. What are the data requirements for this method? [4]
- d. State any three (3) assumptions of the method. [6]
- e. Explain the meaning of the parameters α and β in this relational fertility model. [4]
- f. State two limitations of this technique. [4]

APPENDIX

Table A1: Table Coefficients for $F(i)$ and $f^+(i)$

Age group	a(i)	b(i)	c(i)	x(i)	y(i)	z(i)
15-19	2.531	-0.188	0.0024	0.031	2.287	0.114
20-24	3.321	-0.754	0.0161	0.068	0.999	-0.233
25-29	3.265	-0.627	0.0145	0.094	1.219	-0.977
30-34	3.442	-0.563	0.0029	0.12	1.139	-1.531
35-39	3.518	-0.763	0.0006	0.162	1.739	-0.3592
40-44	3.862	-0.2481	-0.0001	0.27	3.454	-21.497
45-49	3.828	0.016*	-0.0002			

$$F(7) = \phi(6) + a(7)f(7) + b(7)f(6) + c(7)\phi(7)$$

$$f^+(i) = (1 - w(i-1))f(i) + w(i)f(i+1)$$

$$w(i) = x(i) + y(i)\frac{f(i)}{\phi(7)} + z(i)\frac{f(i+1)}{\phi(7)}$$

$$F(i) = \phi(i-1) + a(i)f(i) + b(i)f(i+1) + c(i)\phi(7)$$

$$f^+(7) = (1 - w(6))f(7)$$