Tutorial for BEGIN

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Purpose: BEGIN has been written to enable fast and easy preparation of input files and other parameters for PEP. BEGIN produces as output data files that serve as input in a subsequent PEP run. The files automatically have the correct PEP format. After a BEGIN run a user can start PEP and indicate in **Optional Parameters/Specification file** that the file *params.dat* is to be used as a specification file. No testing of input files is necessary. A description of PEP is available at http://joyx.joensuu.fi/~ek/pep/. Here it is assumed that someone has specified sensible input values. The values used in this illustration should not be considered exemplary.

Background: BEGIN was conceived as a remedy to some common problems encountered by the users of PEP. First, since PEP is parameterized by (sometimes very large) files users have had difficulty in producing inputs that are formally correct. Second, PEP differs from classical cohort-component forecast programs in that forecast uncertainty must be specified, in addition to the most likely future values of the vital rates. BEGIN allows a simplified specification of uncertainty, but we caution that this does restrict the scope of choices available.

To Install: BEGIN is a C++ program and runs under Windows. Installed program takes about 1.8 MB of disk space. (1) Copy the file *BeginSetup.exe* (600 KB) and *BeginTutorial.pdf* (200 KB) into the directory of your choice. (2) Click on the BEGIN Setup icon. (3) Respond to questions as they appear. The questions are self-explanatory, but we suggest that you install BEGIN into the directory in which you intend to subsequently run PEP.

Running BEGIN

Start BEGIN by clicking on the BEGIN icon. The input of data is done in three steps, two first of which are obligatory and the last one is optional. After that, as the fourth step, output is generated. (If you have worked with BEGIN before and saved the configuration file, you can skip manual input (**Steps 1-3** below), click on **Load parameters**, and go directly to **Step 4**.)

Step 1. Basic Parameters

Click on **Specify the basic parameters**. Then enter positive integer values for **(a)–(e)** and change values for **(f)** to other positive integer values if necessary. When all values have been entered (and corrected if necessary!) press **Accept** button. Then BEGIN checks that **(c)≤(d)≤(e)** and remembers the values.

For values used in the tutorial, see the beginning of **Appendix 1**.

Step 2. Point Forecast

Step 2.1. Jump-Off Population

Click on **Specify jump-off population.** Then enter positive integer values for all age and sex

groups of the starting population. For an example, see **File 1** of **Appendix 1**.

Instruction for copying a section of a .pdf-file into BEGIN:

when the *.pdf-file* is open, choose the **Text Select Tool** by clicking on the icon that looks something like this (depending on the version of Acrobat Reader you are using):  ; paint the text to be selected (e.g., the 8 values for males in **File 1**); go to **Edit/Copy**. Switch to BEGIN (e.g., form **2.1 Jump-Off Population**); select first cell by a single click; press CTRL+V.

Step 2.2. Age-Specific Fertility

Click on **Specify future fertility.** Then change values for **(g)** and **(i)** to other positive integer values if necessary, enter a positive real value <10 for **(h)**, and a positive real value for **(j)** that is ≥ than the lowest age of childbearing **(c)** and ≤ than the highest age of childbearing **(d)**, after that enter positive real values (per 1,000) into the table. For an example, see **File 2** of **Appendix 1**.

Step 2.3. Future Mortality

Click on **Specify future mortality**. Then click on **Enter values** and input positive real values for a newborn's mortality probability and projective rates for people at age from 1 to highest age **(e)**.

After accepting probability values and projective rates choose one of three options to specify future rates of decline in mortality. Then enter a positive integer value for **(l)** and real values (positive or negative) into the table if option **1** or **2** was chosen. Click on **Accept** button, then click on **Accept** button of form **2.3**. For an example of option **1**, see **File 3** of **Appendix 1**.

You can see default rates of decline for ages 0-125 in **Appendix 3**.

Referring to *Figure 1*, a newborn's average survival probability to age 0 is the proportion of lifelines starting in *AB* that cross *BC*. Then a newborn's mortality probability = 1 - (average probability of survival). This is the first value entered. The second value is the projective mortality rate from age 0 at *t* to age 1 at *t+1* (i.e. it refers to lifelines that cross *AD*), the third value refers to lifelines that cross *DG* etc. Survival within the highest age is handled by PEP automatically, by extrapolation.

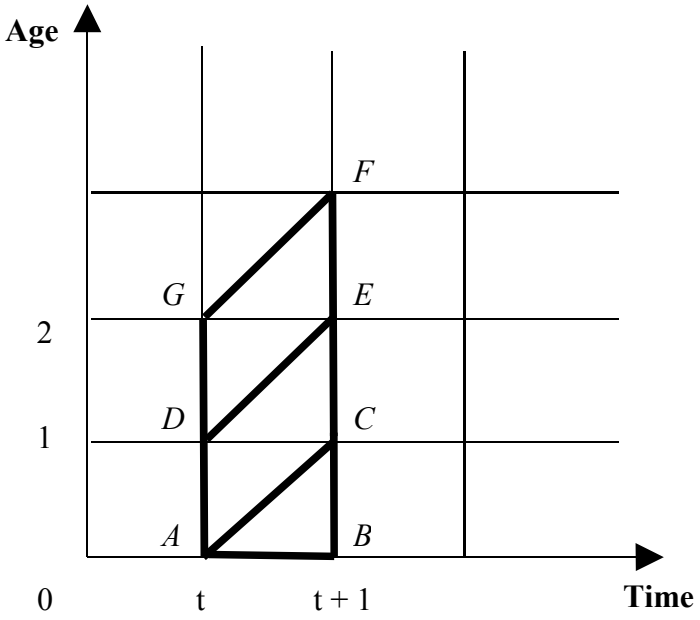

Figure 1. Mortality of population during year *t*.

Note: we see from *Figure 1* that the ages actually refer to the age a person is surviving to (0, 1, ... up to highest age). Survival within the highest age is handled automatically by PEP.

Step 2.4. Future Net Migration

Click on **Specify future net migration.** Then enter a positive integer value for **(k)** and integer values (positive or negative) into the table. For an example, see **File 4** of **Appendix 1**.

Step 3. Level of Uncertainties

This step is optional, you can use default values for uncertainty levels by leaving checkboxes marked. To enter values on your own choice uncheck the appropriate boxes.

Step 3.1. Uncertainty for Fertility

Click on **Level of uncertainty for fertility.** Then choose one of three options. If option **1** was chosen enter a positive real number ≤2. If option **2** or **3** was chosen enter positive real values into the table. For an example of option **3**, see **File 5** of **Appendix 1**.

Default values for uncertainty for age-specific fertility are equal to 0.06

Step 3.2. **Uncertainty for Mortality**

Click on **Level of uncertainty for mortality.** Then choose one of three options. If option **1** was chosen enter a positive real number ≤2. If option **2** or **3** was chosen enter positive real values into the table. For an example of option **3**, see **File 6** of **Appendix 1**.

Default values for uncertainty for mortality are equal to 0.033.

Step 3.3. **Uncertainty for Net Migration**

Click on **Level of uncertainty for net migration**. Then enter positive real value. For an example, see **File 6** of **Appendix 1**.

Default value for uncertainty for net migration is equal to 3.

A note concerning Steps 1-3:

Instead of manually entering of values in **Steps 1-3,** you may click on **Load Parameters** and choose *sampleConfig.ini* for an automatic loading of the values used in this tutorial.

Step 4. File Generation

Click on **Generate files**. Then choose the folder where you want to store data files for future use in PEP.

In addition to the items discussed in **Steps 1-3**, BEGIN will set several parameters required by PEP in the files *kp_asfr.dat*, *kp_asmr.dat*, *kp_net.dat, age_gr.dat, gross.dat* and *params.dat*. These can be altered within PEP but not within BEGIN. For more details see **Appendix 2**. Note in particular the comments regarding **File 11**.

Final note:

In the process of installing BEGIN also an uninstaller was created. To get rid of BEGIN, simply run uninstall.

Appendix 1

Enter the following values to specify **Basic Parameters**:
(a) Number of simulation rounds: 30
(b) Number of forecast years: 5
(c) Lowest age of childbearing: 2
(d) Highest age of childbearing: 4
(e) Highest age: 7
(f) Seed for random number generation: 1

File 1. jpop.dat

Copy the following values into the table to specify **Jump-Off Population**:
For males:

```
100
105
110
100
90
80
50
50
```

For females:

```
100
105
112
105
95
90
65
60
```

The output in file *jpop.dat* should be as follows:

```
(0) M 100
(1) M 105
(2) M 110
(3) M 100
(4) M 90
(5) M 80
(6) M 50
(7) M 50
(0) F 100
(1) F 105
(2) F 112
(3) F 105
(4) F 95
(5) F 90
(6) F 65
(7) F 60
```

File 2. asfr.dat

Enter the following values to specify **Future Fertility**:
(g) Total fertility rate changes linearly until forecast year: 3
(h) Total fertility rate of the forecast year given in **(g)** is: 2.5
(i) Mean age at childbearing changes linearly until forecast year: 3
(j) Mean age at child-bearing of the year given in **(i)** is: 3.05

Copy into the table:
```
500.0
1000.0
200.0
```

The output in file *asfr.dat* should be as follows:
```
(2) FER 709.11003   953.65834   1233.64494   1233.64494   1233.64494
(3) FER 1074.81915   1127.38920   1157.71013   1157.71013   1157.71013
(4) FER 182.73748   152.28579   108.64494   108.64494   108.64494
```

File 3. asmr.dat

Copy the following values into the table to specify **Projective Rates (age ≤ 1) and mortality probability values for newborns**:
For males:
```
0.01
0.05
0.05
0.07
0.09
0.15
0.3
0.5
```
For females:
```
0.01
0.04
0.04
0.06
0.08
0.12
0.25
0.4
```

Enter the following value to specify **Rates of Decline**:
(i) Rates of decline changes linearly until forecast year: 3

Then copy into the table:
Initial decline rate for males:
```
0.05
0.05
0.05
0.05
0.05
0.05
0.05
0.05
```
Initial decline rate for females
```
0.06
0.06
0.055
0.055
0.05
0.045
0.04
0.03
```

Ultimate decline rate for males:
```
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
```
Ultimate decline rate for females:
```
0.015
0.015
0.015
0.015
0.015
0.015
0.015
0.015
```

Output in file *asmr.dat* should be as follows:
```
(0) M 0.00964  0.00954  0.00970  0.00961  0.00951
(1) M 0.04820  0.04772  0.04852  0.04804  0.04756
(2) M 0.04820  0.04772  0.04852  0.04804  0.04756
(3) M 0.06748  0.06681  0.06793  0.06726  0.06659
(4) M 0.08676  0.08590  0.08734  0.08647  0.08561
(5) M 0.14460  0.14316  0.14557  0.14412  0.14268
(6) M 0.28920  0.28632  0.29113  0.28824  0.28537
(7) M 0.48200  0.47720  0.48522  0.48039  0.47561
(0) F 0.00956  0.00942  0.00956  0.00942  0.00928
(1) F 0.03824  0.03767  0.03824  0.03767  0.03711
(2) F 0.03837  0.03780  0.03824  0.03767  0.03711
(3) F 0.05755  0.05669  0.05736  0.05651  0.05566
(4) F 0.07699  0.07585  0.07648  0.07534  0.07422
(5) F 0.11587  0.11415  0.11472  0.11301  0.11133
(6) F 0.24221  0.23860  0.23900  0.23544  0.23194
(7) F 0.39012  0.38432  0.38240  0.37671  0.37110
```

File 4. net.dat

Enter the following value to specify **Net Migration Numbers**:
(k) Number of net migration changes linearly until forecast year: 3

Then copy into the table:
Initial net numbers of migration for males:
```
1
5
10
5
5
3
0
0
```
Initial net numbers of migration for females:
```
0
4
4
0
0
0
0
0
```

Ultimate net numbers of migration for males:

```
0
-3
-3
0
0
0
0
0
```

Ultimate net numbers of migration for females:

```
0
-3
-2
0
0
0
0
0
```

Output in file *net.dat* should be as follows:

```
(0) M 1  0  0  0  0  0
(1) M 5  2  0  -3  -3  -3
(2) M 10  5  1  -3  -3  -3
(3) M 5  3  1  0  0  0
(4) M 5  3  1  0  0  0
(5) M 3  2  1  0  0  0
(6) M 0  0  0  0  0  0
(7) M 0  0  0  0  0  0
(0) F 0  0  0  0  0  0
(1) F 4  1  0  -3  -3  -3
(2) F 4  2  0  -2  -2  -2
(3) F 0  0  0  0  0  0
(4) F 0  0  0  0  0  0
(5) F 0  0  0  0  0  0
(6) F 0  0  0  0  0  0
(7) F 0  0  0  0  0  0
```

File 5. sc_asfr.dat

Choose option **3** in **Uncertainty for Age-Specific Fertility** and copy the following values into the table:

```
0.06
0.07
0.065
```

Output in file *sc_asfr.dat* should be follows:

```
(2) FER 0.06   0.06   0.06   0.06   0.06
(3) FER 0.07   0.07   0.07   0.07   0.07
(4) FER 0.065   0.065   0.065   0.065
```

File 6. sc_asmr.dat

Choose option **3** in **Uncertainty for Mortality** and copy the following values into the table:

```
0.03
0.034
0.033
0.03
0.034
0.033
0.033
0.033
0.03
```

Output in file *sc_asmr.dat* should be as follows:

```
(0) M 0.03  0.03  0.03  0.03  0.03
(1) M 0.034  0.034  0.034  0.034  0.034
(2) M 0.033  0.033  0.033  0.033  0.033
(3) M 0.03  0.03  0.03  0.03  0.03
(4) M 0.034  0.034  0.034  0.034  0.034
(5) M 0.033  0.033  0.033  0.033  0.033
(6) M 0.033  0.033  0.033  0.033  0.033
(7) M 0.033  0.033  0.033  0.033  0.033
(8) M 0.03  0.03  0.03  0.03  0.03
(0) F 0.03  0.03  0.03  0.03  0.03
(1) F 0.034  0.034  0.034  0.034  0.034
(2) F 0.033  0.033  0.033  0.033  0.033
(3) F 0.03  0.03  0.03  0.03  0.03
(4) F 0.034  0.034  0.034  0.034  0.034
(5) F 0.033  0.033  0.033  0.033  0.033
(6) F 0.033  0.033  0.033  0.033  0.033
(7) F 0.033  0.033  0.033  0.033  0.033
(8) F 0.03  0.03  0.03  0.03  0.03
```

Here (0) refers to survival from birth to age 0, (8) refers to survival from age 7 to age 7.

File 7. sc_net.dat

Enter the following value to specify **Uncertainty for Net Migration:** 3.0

Output in file *sc_net.dat* should be as follows:

```
() M 1.02750   1.35925   1.56251   1.69907   1.79468
() F 1.09800   1.45252   1.66972   1.81565   1.91782
```

Note: these values do not, in general, have an independent meaning. They will be multiplied by values in files *age_gr.dat* and *gross.dat* (**Files 11** and **12** in **Appendix 2**). The model used by BEGIN assumes that (with 3.0 entered) the standard deviation for the combined male and female population will have an asymptotic value = 3.0*(size of the jump-off population)/1000.

Appendix 2

There are several output files which are produced without user participation.

File 8. kp_asfr.dat

Kappas for fertility will be as follows:

```
(2) FER 0.00
(3) FER 0.00
(4) FER 0.00
```

File 9. kp_asmr.dat

Kappas for mortality will be as follows:

```
(0) M 0.05
(1) M 0.05
(2) M 0.05
(3) M 0.05
(4) M 0.05
(5) M 0.05
(6) M 0.05
(7) M 0.05
(0) F 0.05
(1) F 0.05
(2) F 0.05
(3) F 0.05
(4) F 0.05
(5) F 0.05
(6) F 0.05
(7) F 0.05
```

File 10. kp_net.dat

Kappas for net migration will be as follows:

```
() M 0.3
() F 0.3
```

File 11. age_gr.dat

Age distribution of gross-migration will be as follows:

```
(0) M  0.102404
(1) M  0.146514
(2) M  0.133541
(3) M  0.131033
(4) M  0.125497
(5) M  0.126795
(6) M  0.120654
(7) M  0.113562
(0) F  0.101169
(1) F  0.158151
(2) F  0.136654
(3) F  0.129063
(4) F  0.121641
(5) F  0.12258
(6) F  0.117717
(7) F  0.113026
```

Note: BEGIN produces reasonable values for this file provided that the highest age is 35 or more.

File 12. gross.dat

The values in the file will be as follows:

```
(1) YEAR  1.053  1.053
(2) YEAR  1.053  1.053
(3) YEAR  1.053  1.053
(4) YEAR  1.053  1.053
(5) YEAR  1.053  1.053
```

The first column refers to males, the second refers to females and the rows correspond to forecast years.

File 13. params.dat

This file contains settings, which are needed to run PEP program. The values in the file will be as follows:

Row number	Values
1	3
2	30 5 2 4 7
3	1
4	-1
5	0
6	0 0
7	0.95 0.95 0.85 0.95 0.9
8	0.95 0.95 0.85 0.95 0.9
9	2 2
10	2 2
11	5 5
12	jpop.dat
13	asmr.dat
14	kp_asmr.dat
15	sc_asmr.dat
16	asfr.dat
17	kp_asfr.dat
18	sc_asfr.dat
19	net.dat
20	kp_net.dat
21	sc_net.dat
22	age_gr.dat
23	gross.dat
24	1
25	3 3 2 2
26	0 4
27	5 7

Below square brackets **[ ]** indicate options that are *not* available via BEGIN.

1. The value in the 1-st row is used for **Specification of Mortality** in PEP menu:

- **1** means **Mortality rates**,
- **2** means **Mortality hazards,**
- **3** means **Projective mortality rates**.

BEGIN sets the value to **3**.

2. The values in the 2-nd row are used for **Input files and parameters/Parameters for simulation rounds, forecast years, lowest and highest ages of child bearing and highest age**:

- The first value is **Number of simulation rounds**,

- The second value is **Number of forecast years**,
- The third value is **Lowest age of childbearing**,
- The forth value is **Highest age of childbearing**,
- Last value is **Highest age**.

BEGIN sets values from **Basic Parameters**.

3. The value in the 3-rd row is used for **Parameters and Options/Sex ratio**, this value is sex ratio at birth between boys and girls.
BEGIN sets the value to 1.

4. The value in the 4-th row is used for **Optional Parameters and Options/Seed (optional)**, this is seed for the initialization of random number generator. PEP requires negative number, so BEGIN sets **Basic Parameters/Seed for random number generation** multiplied by (-1). (See the beginning of **Appendix 1)**
BEGIN sets the value to -1.

[5. The value in the 5-th row is used if **Specification of Mortality/Mortality rates** was chosen (the value in the first row should be equal to **1** in this case). It is used for **Parameters and Options/Correction term for survival probability (mortality rates)** :

- **0** means no correction term is chosen (if other specification of mortality is used),
- **1** means **Keyfitz' method**,
- **2** means **Reed-Merrell formula**.

BEGIN sets the value to 0.**]**

[6. The values in the 6-th row are used if **Specification of Mortality/Mortality rates** or **Specification of Mortality/Mortality hazards** was chosen. If the **Specification of Mortality/Mortality rates** was chosen, so:

- The first value in this row is used for **Separation factors for males** in **Parameter and Option/Separation factors (mortality rates)**,
- The second number in this row is used for **Separation factors for females** in **Parameter and Options/Separation factors (mortality rates)**.

If the **Specification of Mortality/ Mortality hazards** was chosen:

- The first number in this row is used for **Fraction of hazard in age [0, 0.5] for males** in **Parameter and Options/Fraction of hazard in age [0, 0.5] (mortality hazards),**
- The second number in this row is used for **Fraction of hazard in age [0, 0.5] for females** in **Parameter and Options/Fraction of hazard in age [0, 0.5] (mortality hazards)**.

Begin sets the values to `0 0`.**]**

7. The values in the 7-th row are used for **Error Terms/Mortality**, **Error Terms/Fertility** and **Error Terms/Migration**:

- The first value is **Rho eta for male mortality** in **Error Terms/Mortality**,
- The second value is **Rho eta for female mortality** in **Error Terms/Mortality**,
- The third value is **Rho eta for correlation between sexes** in **Error Terms/Mortality**,
- The fourth value is **Rho eta for fertility** in **Error Terms/Fertility**,
- Last value is **Rho eta correlation of net-migration of sexes** in **Terms/Migration**.

BEGIN sets the values to `0.95 0.95 0.85 0.95 0.9`

8. The values in the 8-th row are used for **Error Terms/Mortality**, **Error Terms/Fertility** and **Error Terms/Migration**:

- The first value is **Rho delta for male mortality** in **Error Terms/Mortality**,
- The second value is **Rho eta delta female mortality** in **Error Terms/Mortality**,

- The third value is **Rho delta for correlation between sexes** in **Error Terms/Mortality**,
- The fourth value is **Rho delta for fertility** in **Error Terms/Fertility**,
- Last value is **Rho delta correlation of net-migration of sexes** in **Terms/Migration**.

BEGIN sets the values to `0.95 0.95 0.85 0.95 0.9`

9. The values in the 9-th row are used for the correlation structure of forecast error for the eta and delta terms of mortality in **Error Terms/Mortality**:

- The first value is used for correlation structure of forecast error for the eta terms of mortality: **1** means **Constant correlation** and **2** means **AR(1) model**,
- The second value is used for correlation structure of forecast error for the delta terms of mortality: **1** means **Constant correlation** and **2** means **AR(1) model**.

BEGIN sets the values to `2 2`

10. The values in the 10-th row are used for the correlation structure of forecast error for the eta and delta terms of fertility in **Error Terms/Fertility**:

- The first value is used for the correlation structure of forecast error for the eta terms of fertility: **1** means **Constant correlation** and **2** means **AR(1) model,**
- The second value is used for the correlation structure of forecast error for the delta terms of fertility: **1** means **Constant correlation** and **2** means **AR(1) model**.

BEGIN sets the values to `2 2`

11. The values in 11-th row are used for **Limit year for mortality** in **Error Terms/Mortality** and for **Limit year for fertility** in **Error Terms/Fertility**.
BEGIN sets the values to `5 5`

12-23. The values in rows form the 12-th to the 23-rd inclusive define the input data files in **Input files and parameters/Point forecasts** and **Input files and parameters/kappas and scales**:

- 12-th row: data file for jump-off population *jpop.dat* in **Input files and parameters/Point forecast**
- 13-th row: data file for projective mortality rates *asmr.dat* in **Input files and parameters/Point forecasts**
- 14-th row: data file for kappas for mortality rates *kp_asmr.dat* in **Input files and parameters/kappas and scales**
- 15-th row: data file for weights for mortality rates *sc_asmr.dat* in **Input files and parameters/kappas and scales**
- 16-th row: data file for future fertility rates *asfr.dat* in **Input files and parameters/Point forecasts**
- 17-th row: data file for kappas for fertility rates *kp_asfr.dat* int **Input files and parameters/kappas and scales**
- 18-th row: data file for weights for fertility rates *sc_asfr.dat* in **Input files and parameters/kappas and scales**
- 19-th row: data file for future net-migration rates *net.dat* in **Input files and parameters/Point forecasts**
- 20-th row: data file for kappas for net-migration numbers *kp_net.dat* in ***I*nput files and parameters/kappas and scales**
- 21-th row: data file for weights for net-migration numbers *sc_net.dat* in **Input files and parameters/kappas and scales**
- 22-th row: data file for age-distribution of gross-migration *age_gr.dat* in **Input files and parameters/Point forecasts**
- 23-th row: data file for future gross-migration *gross.dat* in **Input files and parameters/Point forecasts**

The values in rows from the 24-th to the 27-th are used for the **Aggregated Files**.

24. The value in the 24-th row is used to define **if the default 5-year age-groups are used** in **Aggregated Output** or not, the corresponding values are **1** or **0**
BEGIN sets the value to 1.

25. The values in the 25-th row are used for following setting:
The first value sets the way of **Files to be output** :

- **1** means **files containing sample paths**,
- **2** means **annual files**,
- **3** means **both ways**.

The second value sets the way **Sex to be output** :

- **1** means **males**,
- **2** means **females**,
- **3** means **both**.

The third value sets **If both sexes are chosen above the sexes should be** :

- **1** means **together,**
- **2** means **separately**.

The last value sets the **Number of age groups per sex (max 25)**.
BEGIN sets the values to `3 3 2 2`

26-27. The values in rows form the 26-th to the 27-th set values for **Lowest and highest ages in each group**: each row corresponding to one group: the 26-th row corresponding to **Group 1**, the 27-th row corresponding to **Group 2**. The first value in the row is **LOW** age in group, and the second is **HIGH** age.

Appendix 3

Default rates of decline for ages from 0 to 125:

	Males	Females
0	0.041168	0.038207
1	0.040367	0.038205
2	0.039908	0.038228
3	0.039762	0.037927
4	0.039627	0.036656
5	0.039417	0.034743
6	0.039304	0.033471
7	0.039327	0.033156
8	0.038902	0.032714
9	0.037072	0.030930
10	0.034319	0.028245
11	0.032489	0.026460
12	0.032035	0.026018
13	0.031405	0.025712
14	0.028859	0.024480
15	0.025026	0.022629
16	0.022480	0.021397
17	0.021850	0.021099
18	0.021435	0.021032
19	0.019776	0.020713
20	0.017285	0.020225
21	0.015625	0.019898
22	0.015219	0.019814
23	0.015091	0.019685
24	0.014524	0.019164
25	0.013656	0.018379
26	0.013070	0.017858
27	0.012920	0.017733
28	0.012980	0.017701
29	0.013194	0.017553
30	0.013491	0.017329
31	0.013677	0.017178
32	0.013717	0.017139
33	0.013870	0.017082
34	0.014514	0.016846
35	0.015488	0.016489
36	0.016132	0.016252
37	0.016281	0.016194
38	0.016280	0.016207
39	0.016329	0.016250
40	0.016413	0.016309
41	0.016466	0.016346
42	0.016473	0.016355
43	0.016559	0.016353
44	0.016928	0.016349
45	0.017489	0.016344
46	0.017862	0.016337
47	0.017954	0.016329
48	0.017927	0.016385
49	0.017829	0.016622
50	0.017690	0.016977
51	0.017596	0.017214

52	0,017571	0,017273
53	0,017625	0,017380
54	0,017834	0,017810
55	0,018142	0,018456
56	0,018345	0,018887
57	0,018395	0,018993
58	0,018505	0,019098
59	0,018955	0,019516
60	0,019644	0,020142
61	0,020110	0,020561
62	0,020227	0,020666
63	0,020157	0,020805
64	0,019898	0,021373
65	0,019531	0,022230
66	0,019293	0,022799
67	0,019234	0,022931
68	0,019133	0,022929
69	0,018732	0,022973
70	0,018133	0,023053
71	0,017734	0,023111
72	0,017635	0,023128
73	0,017418	0,023074
74	0,016533	0,022859
75	0,015198	0,022539
76	0,014312	0,022334
77	0,014094	0,022293
78	0,013976	0,022095
79	0,013509	0,021273
80	0,012811	0,020037
81	0,012344	0,019215
82	0,012226	0,019011
83	0,012115	0,018721
84	0,011674	0,017551
85	0,011017	0,015794
86	0,010576	0,014624
87	0,010465	0,014334
88	0,010258	0,014095
89	0,009424	0,013139
90	0,008167	0,011707
91	0,007332	0,010751
92	0,007126	0,010512
93	0,006993	0,010279
94	0,006456	0,009333
95	0,005648	0,007908
96	0,005112	0,006962
97	0,004987	0,006744
98	0,005003	0,006773
99	0,005012	0,006787
100	0,005012	0,006787
101	0,005012	0,006787
102	0,005012	0,006787
103	0,005012	0,006787
104	0,005012	0,006787
105	0,005012	0,006787
106	0,005012	0,006787
107	0,005012	0,006787
108	0,005012	0,006787

109	0,005012	0,006787
110	0,005012	0,006787
111	0,005012	0,006787
112	0,005012	0,006787
113	0,005012	0,006787
114	0,005012	0,006787
115	0,005012	0,006787
116	0,005012	0,006787
117	0,005012	0,006787
118	0,005012	0,006787
119	0,005012	0,006787
120	0,005012	0,006787
121	0,005012	0,006787
122	0,005012	0,006787
123	0,005012	0,006787
124	0,005012	0,006787
125	0,005012	0,006787