*FluMOMO v4 Standard Operating Procedure*

**FluMOMO v4 is available as both a Stata and an R package. Programs, setup, running and output is the same for both. Hence, the instructions below cover both packages.**

**Limitations**:

The Stata version was coded in Stata version 14, and have not been tested in any other version.

The R version was coded in R version 3.3.3, and have not been tested in any other version.

The output from the Stata and the R versions are the same, but there are differences in the graphic designs.

**Install the FluMOMO programs**:

1. Create the general folder (work directory) for your FluMOMO program files
2. Download and place the program files: **FluMOMO\_v4, Estimation\_v4, Output\_csv, Output\_IA\_ET\_v4, Output\_calendar\_v4** and **Output\_cummulated\_v4** fileshere
3. Create a subfolder called **data**, for input data

Note: The R version demand some R-packages to be installed, which is a onetime action.  
Commands to do this are at the top of the R-program FluMOMO\_v4. Remove the #’s and run.

**Input datasets**

All input data must be placed in the subfolder **data**.

Number of deaths (mandatory)

This must be aggregated number of deaths per week and age group.

These data can be:

* from A-MOMO  
  Save the complete A-MOMO output file you want to use (EUROMOMOv4-3-COMPLETE-[Your country name]-[year]-[ week]) in the input directory, data.  
  Rename it to: **A-MOMO data**.txt
* self-provided  
  Provide a csv-file (“,” separated) containing number of deaths (deaths) ***by age group, year, week*** (i.e. *year, week, agegrp: 0 = 0-4, 1 = 5-14, 2 = 15-64, 3 = 65+, 4 = total*). Save in the input directory, data, as **deaths.csv**

Population (optional)

If you have population figures (N) on age group, year and week, then they can be included in the estimation, and mortality rates calculated.

Estimated number of deaths associated to IA and ET will always be calculated, but if you have population figures then mortality rates will also be created.

Save a cvs-file (“,” separated) with population figures (agegrp, year, week, N) in the input directory, data, as **population.csv**

Influenza Activity data (mandatory)

A csv-file (“,” separated) containing indicators for weekly Influenza Activity (IA) ***by age group*** (i.e. *IA, week, year, agegrp: 0 = 0-4, 1 = 5-14, 2 = 15-64, 3 = 65+, 4 = total*) and save it in the input directory, data, as **IA.csv**  
If you do not have information about IA for each age group, you can use the same over-all for each age group.  
The variable called ‘IA’, describing the influenza activity may be ILI, ARI, Positive Percent or (preferable) the Goldstein Indicator (ILI\*positive percent).

Temperature data (mandatory)

Go to <https://owncloud.thl.fi/index.php/s/XzFScXdp878D4mh?path=%2Fwd>  
and download the Stata dataset called “daily-[your country code].dta” into the input directory, data, and rename it to **daily.dta** i.e. without country code

**NOTE**

* + Each input datasets must cover at least the calendar period of interest.
  + There must be a record for all weeks in the calendar period (no holes).  
    If for example there are no IA, then the record may have either IA=0 or IA=missing.
  + Age groups must be numbers: 0 (0-4), 1 (5-14), 2 (15-64), 3 (65+), 4 (Total)
* The datasets are merged on age group, year, week (only year, week for temperature data) and only data common for all is used.

**Setup of FluMOMO**

Open the program FluMOMO\_v4

1. Write name of your country
2. Define the work directory: wdir (see installation 1.)
3. Define study period by start\_year, start\_week and end\_year, end\_week  
   - It is recommended to use maximum a 5 year/season period, and minimum a 3 year/season period
4. Define if deaths input data will be from A-MOMO output or a self-provided file  
   - see Input datasets, Number of deaths
5. Define if an input file with population data is available  
   - if available, mortality output will also be created  
   - see Input data, Population
6. Define if output should be restricted to positive effects of IA  
   - The FluMOMO model may estimate negative i.e. life saving, effects of IA in some weeks, which is biologically implausible. Hence, we recommend excluding them from the output. For further details, see model description.  
   All outputs restricted to positive effects of IA will be marked …\_IArestricted
7. Define number of lagged effects of IA and ET to be included in the model  
   - we recommend 2 weeks for both

Please don’t change anything else in the program FLUMOMO\_v4, or any of the other programs.

**Run FluMOMO\_v4**  
Run the FluMOMO program, this will run all the program files, and create all outputs

A new sub directory: **FluMOMO\_***end\_year***w***end\_week* will be created, with two subdirectories:

* data - containing a copy of all input data
* output - containing all outputs

**FluMOMO\_v4 output**

**Note**: If restricted to positive IA effect, then all output have the extension …\_IArestricted

Cumulated deaths attributable to IA and ET

*Three* csv-files (“;” separated) containing cumulated number of deaths attributable to IA (cAI) and ET (cET) with 95% confidence intervals, plus cumulated excess number of deaths relative to the baseline (excess), and cumulated residual excess relative to the full model including both IA and ET (uexcess):

* summer\_deaths\_v4.csv  
  – covering week 21 to and including week 39 each year
* winter\_deaths\_v4.csv  
  – covering week 40 to and including week 20 the following year
* year\_deaths\_v4.csv  
  – covering the calendar year, week 1 to and including week 52/53

Cumulated mortality attributable to IA and ET

**Note:** Only if file with population is available (see setup)

Three csv-files (“;” separated) containing cumulated mortality rates attributable to IA (cAI) and ET (cET) with 95% confidence intervals, plus cumulated excess mortality relative to the baseline (excess), and cumulated residual excess relative to the full model including both IA and ET (uexcess):

* summer\_mr\_v4.csv  
  – covering week 21 to and including week 39 each year
* winter\_mr\_v4.csv  
  – covering week 40 to and including week 20 the following year
* year\_mr\_v4.csv  
  – covering the calendar year, week 1 to and including week 52/53

Graphs showing IA and ET

Temperature\_v4.png  
- Graph showing ambient temperatures and excess temperatures (ET) used in the FluMOMO model.

IA\_agegrpoups\_v4.png  
- Influenza Activity (IA) used in the FluMOMO model, by age group

For each age group (*a*): 0=0-4, 1=5-14, 2=15-64, 3=65+, 4=Total  
- IA\_agegroup\_*a*\_v4.png

Graphs showing deaths over calendar time

deaths\_agegroups\_v4.png  
- graph showing observer number of deaths, baseline, and effects of IA and ET, by age group

For each age group (*a*): 0=0-4, 1=5-14, 2=15-64, 3=65+, 4=Total  
- deaths\_agegroup\_*a*\_v4.png

Graphs showing mortality over calendar time

**Note:** Only if file with population is available (see setup)

mr\_agegroups\_v4.png  
- graph showing observer mortality rate, baseline, and effects of IA and ET, by age group

For each age group (*a*): 0=0-4, 1=5-14, 2=15-64, 3=65+, 4=Total  
- mr\_agegroup\_*a*\_v4.png

Graphs showing cumulated deaths attributable to IA

For each *period*: summer, winter and calendar year, by age group  
- cumulated\_IA\_deaths\_*period*\_agegroups\_v4.png  
For each age group (*a*): 0=0-4, 1=5-14, 2=15-64, 3=65+, 4=Total  
- cumulated\_IA\_deaths\_*period*\_agegroup\_*a*\_v4.png

Graphs showing cumulated mortality attributable to IA

**Note:** Only if file with population is available (see setup)

For each *period*: summer, winter and calendar year, by age group  
- cumulated\_IA\_mr\_*period*\_agegroups\_v4.png  
- cumulated\_IA\_mr\_*period*\_agegroup\_*a*\_v4.png  
  
CSV- file (“;” separated) with total output data: [country]\_output\_v4.csv

|  |  |
| --- | --- |
| **Variable** |  |
| country | Your country, as defined |
| IArestricted | 1 if restricted to only positive IA effects |
| agegrp | age group (0=0-4, 1=5-14, 2=15-64, 3=65+, 4=total) |
| Year | ISO year |
| Week | ISO week |
| deaths | number of deaths |
| N | Population, 1 by default |
| IA | Influenza Activity |
| ET | Extreme Temperatures |
| EIA | Mean effect where ET is excluded |
| VEIA | Estimation variance of EIA |
| EET | Mean effect where IA is excluded |
| VEET | Estimation variance of EET |
| EB | Baseline |
| EB\_95L | Lower 95% baseline reference interval |
| EB\_95U | Upper 95% baseline reference interval |
| RVB | Residual baseline variance |
| EdIA | Mean number of deaths attributable to IA |
| EdIA\_95L | Lower 95% EdIA confidence interval |
| EdIA\_95U | Upper 95% EdIA confidence interval |
| VRdIA | Residual dIA variance |
| EdET | Mean number of deaths attributable to ET |
| EdET\_95L | Lower 95% EdET confidence interval |
| EdET\_95U | Upper 95% EdET confidence interval |
| VRdET | Residual dET variance |
| cexcess\_year | Cumulated excess, observed - EB |
| cuexcess\_year | Cumulated unexplained excess, observed - (EB+EdIA+EdET) |
| cEdIA\_year | Cumulated Mean number of deaths attributable to IA |
| cEdIA\_year\_95L | Cumulated Lower 95% EdIA confidence interval |
| cEdIA\_year\_95U | Cumulated Upper 95% EdIA confidence interval |
| cEdET\_year | Cumulated mean number of deaths attributable to ET |
| cEdET\_year\_95L | Cumulated lower 95% EdET confidence interval |
| cEdET\_year\_95U | Cumulated upper 95% EdET confidence interval |
| summer | 1 for 20 < week < 40 |
| cexcess\_ summer | Cumulated excess = observed - EB |
| cuexcess\_ summer | Cumulated unexplained excess = observed - (EB+EdIA+EdET) |
| cEdIA\_ summer | Cumulated Mean number of deaths attributable to IA |
| cEdIA\_ summer\_95L | Cumulated Lower 95% EdIA confidence interval |
| cEdIA\_ summer \_95U | Cumulated Upper 95% EdIA confidence interval |
| cEdET\_ summer | Cumulated mean number of deaths attributable to ET |
| cEdET\_ summer \_95L | Cumulated lower 95% EdET confidence interval |
| cEdET\_ summer \_95U | Cumulated upper 95% EdET confidence interval |
| winter | 1 for 40 ≤ week or week ≤ 20 |
| cexcess\_ winter | Cumulated excess = observed - EB |
| cuexcess\_ winter | Cumulated unexplained excess = observed - (EB+EdIA+EdET) |
| cEdIA\_ winter | Cumulated Mean number of deaths attributable to IA |
| cEdIA\_ winter\_95L | Cumulated Lower 95% EdIA confidence interval |
| cEdIA\_ winter \_95U | Cumulated Upper 95% EdIA confidence interval |
| cEdET\_ winter | Cumulated mean number of deaths attributable to ET |
| cEdET\_ winter \_95L | Cumulated lower 95% EdET confidence interval |
| cEdET\_ winter \_95U | Cumulated upper 95% EdET confidence interval |