

Frequently asked questions about LTAS.NET

General

Q-G1: What is the NIOSH Life Table Analysis System?

A-G1: The NIOSH Life Table Analysis System (LTAS.NET) is a software tool used to analyze groups (“cohorts”) of people (usually workers) who are followed over time to determine if disease incidence or mortality is higher than expected among the group, either compared to a referent population or internally to compare higher- with lower-exposed people. In life table analyses, person-time and observed events are grouped into strata; standardized event rates are calculated among the strata to produce a standardized event ratio (compared to either a general population or to a group within the cohort). The standardization variables generally include age, sex, race, and calendar year. NIOSH has developed and distributed Life Table Analysis programs since the 1970s. The new system, LTAS.NET, was released in August 2007.

Q-G2: Why did NIOSH create a new Life Table Analysis System, LTAS.NET?

A-G2: The previous version, PC-LTAS, was created in the mid-1990s as a DOS-based program for the personal computer. There were several reasons that NIOSH has created a new version for Windows, called LTAS.NET. The DOS environment has become unreliable in modern personal computers. There were also requests by users for new features that could not be accommodated in PC-LTAS. Lastly, minor discrepancies were noted in date handling and some statistical calculations that have been resolved in LTAS.NET.

Q-G3: How does the NIOSH LTAS.NET differ from previous versions of LTAS (e.g., PC-LTAS)?

A-G3: The most obvious difference is the computing platform. LTAS.NET is a stable, user-friendly and reliable NIOSH life table analysis system for the Windows environment. It is written in Microsoft® database engine platform, developed using Microsoft® Visual Studio® .NET and Microsoft® SQL Server Desktop Edition.

Other differences include:

- LTAS.NET has more flexible options than PC-LTAS for importing and analysis of data and reporting of results.
- The user can stratify on any number of user-defined fixed and time-dependent covariates and can analyze more than a single exposure simultaneously.
- The user can include a global categorical indicator variable that changes for everyone at the same time point
- The user can stratify workers by active and inactive employment status, with inactive status lagged by any length of time desired.

- There are two options for handling events and person-time that lag to zero. The user can include these in the lowest exposure category (default), or choose to include them in a separate category, as was done in PC-LTAS.
- The user can export stratified event and person-time data for more complex analyses (e.g., Poisson regression) in other software.
- Slight errors and inconsistencies in handling of dates and flagging of significance were corrected in LTAS.NET.

Q-G4: Whom do I contact with questions or comments on LTAS.NET?

A-G4: Please direct all inquiries about the software to nioshltas@cdc.gov

Q-G5: Will NIOSH continue to support PC-LTAS?

A-G5: With the release of LTAS.NET, NIOSH will no longer provide access to the older versions of the Life Table program, PC-LTAS. NIOSH will no longer create new rate files for PC-LTAS. However, existing rate files for PC-LTAS will still be made available for download, for the benefit of current users of PC-LTAS.

Import

Q-I1: Are there conversion programs available that will convert PC-LTAS input files into LTAS.NET input files?

A-I1: We found there were too many variants based on the objectives of each cohort study to provide a generalized conversion program (for example, the user may need to make a new history files that incorporates several time-dependent covariates, as well as a person file that includes fixed additional covariates like SES).

The PC-LTAS demographic file can generally be used as the source of the Person file in LTAS.NET, selecting the variables needed as directed in the file input wizard in LTAS.NET. One can also easily create the Outcome file from the demographic file provided one recodes the ICD codes to include the decimal, if it exists in that code, and also adds variables to indicate whether the outcome is terminal (i.e., a cause of death) and whether it is underlying (see example SAS code below for a study using underlying causes of death only).

```
data outcome;
set demogr;
length ucod $ 5;
term='T';
und='T';
if substr(ucod,4,1)='X' then ucod1=substr(ucod,1,3);
else if length(trim(ucod))>3 then ucod1=substr(ucod,1,3)||'.'||substr(ucod,4,1);
else ucod1=ucod;
run;
```

The PC-LTAS personal dose file can also generally be used as the history file without problem, if just a single time-dependent exposure (say, badge dose) is of interest. If use of duration of employment is also desired, then a "1" should also be included as the exposure level during the time periods over which employment occurs. This assigns a daily "exposure" of 1 day for each day of work (assuming a 365.25-day work-year). If one wishes to use area dose or include more than one time-dependent exposure, it is best to start fresh because each line within the history file is a time period over which each time-dependent exposure is presumed to be a constant daily exposure.

Q-I2: When I run a cohort through LTAS.NET when the NIOSH 119 minor rate file is specified and the outcome file option to use the ICD revision "In Effect at the Time of Death" is selected, I noticed that ICD codes for all deaths occurring 1940-1949 are listed as an outcome file redemption with exception type "Unknown ICD"; however, the ICD codes for deaths occurring 1950-1959 are not described in this way. Is something wrong?

A-I2: The NIOSH 119 minor rate file begins in 1960 and includes codes from the 7th, 8th, 9th, and 10th revisions of the ICD. Deaths in 1940-1948 are assigned to the 5th revision of the ICD and deaths in 1949 are assigned to the 6th revision of the ICD. Since LTAS.NET verifies ICD codes for all outcomes against the rate file prior to rejecting outcomes for "Occurrence Date not in rates", outcomes with codes under the 5th and 6th revisions of the ICD will be flagged as "Unknown ICD". The user should be cautioned to check codes flagged as "Unknown ICD" for outcomes coded to the 7th, 8th, 9th, and 10th revisions of the ICD when the NIOSH 119 minor rate file is used; however, 5th and 6th revision codes flagged as "Unknown ICD" are not necessarily invalid.

Q-I3: When I run a cohort through LTAS.NET using the NIOSH 119 minor rate file and the time at risk option to end risk accumulation for workers lost to follow-up at the "Earlier of Date Last Observed or End of Study" is selected, I noticed that workers who are lost to follow-up prior to 1960 are not "rejected", rather they receive a warning "rates not available – DLO". In addition, these workers are "counted" in the LTAS.net import data processing window although they contribute 0 person-years at risk. Is something wrong?

A-I3: The NIOSH 119 minor rate file begins in 1960. Workers lost to follow-up prior to 1960 will not contribute person-years at risk to the analysis, unless the user specifies "End of Study" for the time at risk option to end risk accumulation. The user should be cautioned that when "Earlier of Date Last Observed or End of Study" is specified, workers who are lost to follow-up prior to 1960 are not rejected per se and therefore, the number of persons described as "available" at the end of import includes workers lost to follow-up prior to the rate begin date. Users may wish to subtract persons lost-to-follow-up prior to 1960 from the number of persons reported as "available". However, the reported person-years at risk are correct for the cohort.

Q-I4: In looking at the import history file warnings report I am getting the message "> 1 history exception" for several workers. When I review their history data I can find no reason for exceptions. Why am I getting this message?

A-I4: When you receive this message look first at the person file rejection report. It is possible that the person has been rejected and that is why their history data is receiving the exception.

Stratify

Q-S1: When I run the same cohort data through LTAS.NET and PC-LTAS, I get slightly different person-years and events accruing to my various strata. Is LTAS.NET doing something wrong?

A-S1: In developing LTAS.NET, we discovered some inconsistencies in the way that PC-LTAS handles dates and transition days between stratified categories. The method used by LTAS.NET and how it differs from PC-LTAS are described in detail in Appendix A of the documentation (it can be found easily by searching on "date handling" from the Help pulldown menu). Extensive testing has confirmed that LTAS.NET is correctly stratifying data according to the description in Appendix A.

Rate files

Q-R1: What rates are available for LTAS.NET?

A-R1: Currently, the LTAS.NET software contains underlying cause of death (UCOD) rates and proportions for the U.S. population from 1940-2004 (NIOSH-92) and an expanded set of rates and proportions for the U.S. population from 1960-2004 (NIOSH-119). Further information about these rates is provided in Robinson et al. (2006). *J Occ Environ Med* 48:662-667. Users may also download rates and proportions for each individual state from 1960-2004 at . Each state rate of interest (but not the cause map) must be loaded into LTAS.NET using the "Manage Rates→Import Rate Set" pull-down menu.

Q-R2: What do I need to create rate files for my own country?

A-R2: Rate files may be created easily by the user for LTAS.NET. A two-stage process is involved, in which a cause map is created (if the user wishes to define categories differently than in the two cause maps provided with LTAS.NET: NIOSH-92 http://tnio-cnt-webdev/dshefs/dkw0/ltas-dev/PDFs/NIOSH-92_table_2006-05.pdf and NIOSH-119 http://tnio-cnt-webdev/dshefs/dkw0/ltas-dev/PDFs/NIOSH-119_table_2006-05.pdf), and a rate set is created with the actual rate data. This process is described in Appendix E of the documentation for LTAS.NET.

Q-R3: I noticed that some of the rate file categories appear to differ between the standard (92-cause) and expanded (119-cause) rate files. Why are they different?

A-R3: The following table documents the differences between the two rate files. Further information is provided in Robinson et al. (2006). J Occ Environ Med 48:662-667. The NIOSH-92 categories are described at http://tnio-cnt-webdev/dshefs/dkw0/ltas-dev/PDFs/NIOSH-92_table_2006-05.pdf , and the NIOSH-119 categories at http://tnio-cnt-webdev/dshefs/dkw0/ltas-dev/PDFs/NIOSH-119_table_2006-05.pdf .

Cause of death	Treatment in 92-cause file	Treatment in 119-cause file
Malignant neoplasm (MN) of testis and other male genital organs	Minor 24 (MN other male genital) includes all male genital organs other than prostate	Minor 25 (MN testis) contains only testis. All other male genital other than prostate are in Minor 36 (MN other & unspecified site)

Q-R4: I just read about the updated version, LTAS.net, and it appears that the mortality rates included in the program run through 2004. Does the rate data also go through 2004?

A-R4: No, our current rate files have data through 2002 although the rate data can be used through 2004 and even beyond. The rate for the five-year period 2000-2004 (or any period beyond it) is estimated by the rate for 2000-2002.

We have just started working on getting the 2003-2005 data incorporated into our rates. Stay tuned via our WEB site for availability.