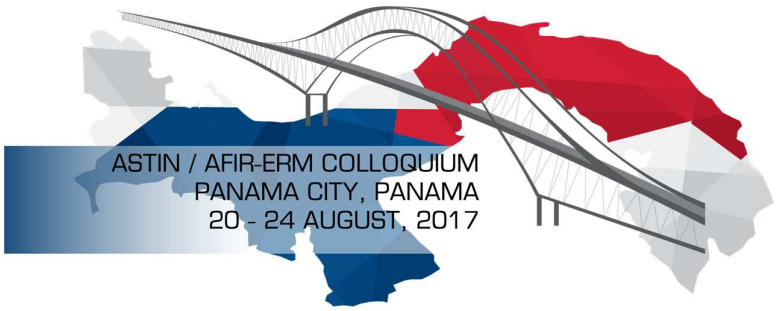

SYNOPSIS

TITLE LIFE TABLES FOR WORK-RELATED INJURED OR ILL PEOPLE

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Key words: Life table, mortality of Inail annuitants, accident and occupational disease, claim age, class of impairment

Purpose of your paper: Our presentation shows life expectancy of Inail permanent disabled annuitants, establishing that the variables that mostly affect mortality level are claim age, severity of impairment and type of event (accident or occupational disease). The study also concerns life tables of widow(er)s and orphans of deceased workers due to a work accident or occupational disease.

Synopsis:

The *National Institute for insurance against accidents at work* (**Inail**) pays social security benefits to employees involved in an accident at work and, in case of death, to their survivors.
Inail, for actuarial valuations (pricing, reserving) uses specific coefficients. Inail "*Statistical and Actuarial Office*" has recently carried out a study focused at monitoring mortality (i.e. demographic hypothesis for such coefficients) among Inail annuitants.
Our presentation intends to compare Inail life tables with those released by "*National Institute of Statistics*" (Istat) for Italian population.
The observation period runs from 01/01/1996 to 31/12/2013; the choice of such a range allows us to have a sufficiently consistent data-base for our statistical analysis:

- Annuities in payment at the beginning: 1,380,258
- New annuities during the period (entries): 433,058
- Ceased annuities during the period (exits): 1,016,963
- Annuities in payment at the end: 796,353

Mortality rates have been calculated using "*average lifespan method*"; relative frequencies of deaths are "*pure rates*"(i.e. not depending on any other cause of elimination); empirical data have been smoothed using "*piecewise smoothing*" and, in order to take account of "*longevity risk*", mortality rates has been projected.
Life tables have been constructed analyzing separately the cohort of annuitants with permanent disability **(a)** and the one of injured or ill workers' survivors **(b)**.
(a) For permanent disabled annuitants, our study shows that the variables that mostly affect general mortality level are claim age (valuation year minus the year in which the accident has occurred), severity of impairment (class of percentage) and, only for claim ages less than 10 years, type of event (accident or occupational disease).

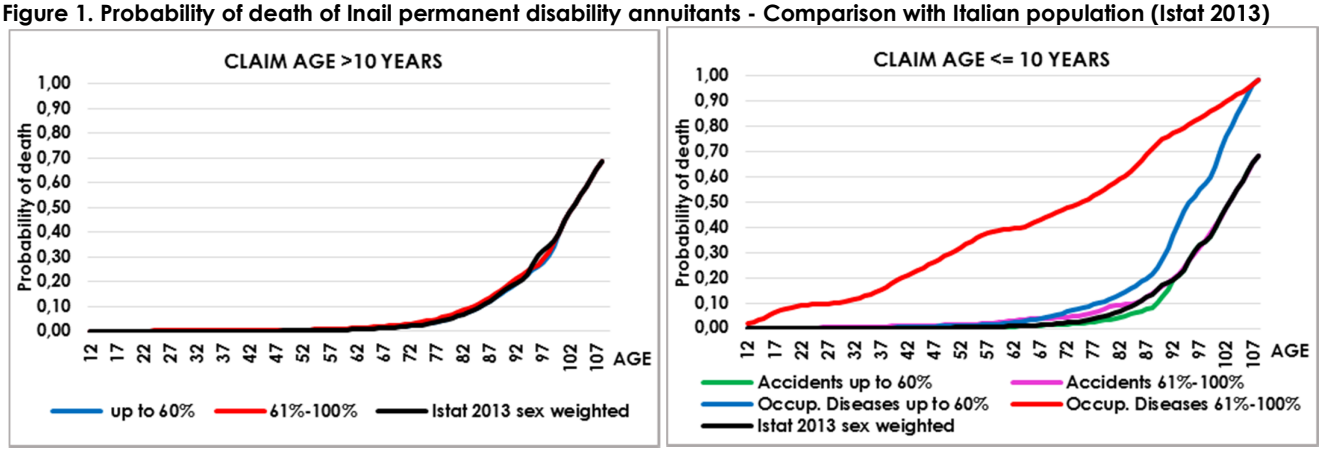
Table 1. Life expectancy of Inail permanent disability annuitants - Comparison with Italian population (Istat)

AGE	CLAIM AGE						Istat 2013 sex weighted
	> 10 YEARS		<= 10 YEARS				
	Accidents and Occupational Diseases		Accidents		Occupational Diseases		
	up to 60%	61%-100%	up to 60%	61%-100%	up to 60%	61%-100%	
20	59,57	55,55	62,68	47,98	51,12	8,97	60,88
40	40,53	37,68	43,50	31,05	32,12	4,00	41,44
60	22,54	20,61	25,34	17,24	15,79	2,03	23,09
80	8,32	7,60	10,20	7,62	5,55	1,25	8,38

The above reported data show that, for higher claim ages together with low and mid impairment, as a result of the stabilization of after-effects, mortality of Inail annuitants with permanent disability is wholly similar to Italian general population mortality, with no significant differences between the two events; whilst for lower claim ages there is a substantial difference

between accidents and occupational diseases, with particular emphasis on the most serious diseases, including all forms of cancer (even those related with asbestos), that cause a very low life expectancy.

Figure 1. Probability of death of Inail permanent disability annuitants - Comparison with Italian population (Istat 2013)



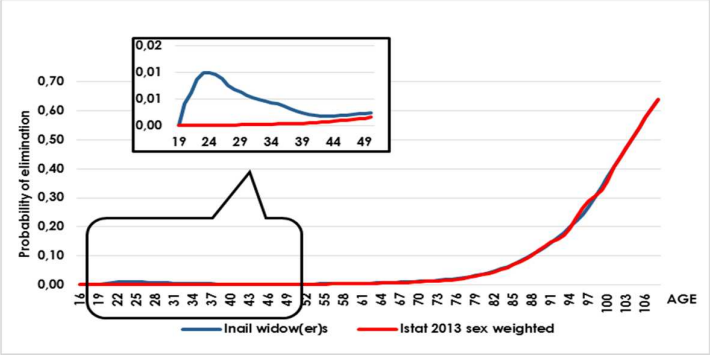
The purpose of our study was also an analysis of the *specific mortality* (due to the event) of permanent disabled annuitants, needed for computation of so-called "*Family insurance*", that is the second-order capitalization coefficient that allows Inail to valuate the future cost burden in case of death of the injured or ill worker.

Table 2. Specific mortality rates (x1.000) of Inail permanent disabled annuitants

AGE	CLAIM AGE					
	> 10 YEARS		<= 10 YEARS			
	Accidents and Occupational Diseases		Accidents		Occupational Diseases	
	up to 60%	61%-100%	up to 60%	61%-100%	up to 60%	61%-100%
30	0,00	0,01	0,01	2,01	0,07	72,93
40	0,00	0,02	0,02	4,92	0,79	170,21
50	0,02	0,80	0,08	8,57	4,75	295,72
60	0,19	1,28	0,08	14,21	11,76	365,43
70	0,69	3,16	0,22	21,13	35,49	403,45
80	3,04	8,73	0,37	50,82	65,09	438,84

(b) The analysis of the survivors group covered widow(er)s and orphans of deceased workers due to a work accident or occupational disease. Life tables built for these sort of survivors have the peculiarity to consider, in addition to death, other causes of annuity termination, such as remarriage for widow(er)s and end of studies for orphans.

Figure 2. Probability of elimination (death+remarriage) of widow(er)s who receive an Inail annuity- Comparison with Italian population (Istat 2013)



As shown in Figure 2, Inail surviving widow(er)s' mortality is similar to Italian population's one; the remarriage is significant only under age 50.
In Figure 3, it has been reported the elimination (death+end of studies) curve for orphans who receive an Inail annuity; the probability of elimination at age 26 is equal to one, because 26 is the maximum age at which one student is entitled to receive such benefit, as prescribed by law.

Figure 3. Probability of elimination (death+end of studies) of orphans who receive an Inail annuity - Comparison with Italian population (Istat 2013)