Discussion session after tool presentation

EPHOR Exposome tools for a healthy working life

- Please consider these questions during the presentation to provide feedback afterwards for the discussion
- Please answer these in your role professionally and think about other potential users:
  - For what purposes would you use this tool?
  - What other features would make this tool useful?
  - Would somebody else use the tool? Who are they and why?

EPHOR
Exposome tools for a healthy working life

Working life expectancy

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Outlines of presentation

EPHOR Exposome tools for a healthy working life

- Introduction to the tool “Working life expectancy”
  - To whom the tool is meant for?
  - Aim of the tool
  - What does it include?
- Working life expectancy (WLE)/healthy working life expectancy (HWLE)
  - Definition
  - Why do we need WLE/HWLE?
- How does the tool work
- Summary

Practical guide for calculating working life expectancy (WLE) using Sullivan method (Leinonen & Solovieva, upcoming)

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- For whom the tool is meant for?
  - Researchers
- Aim
  - To introduce approaches for examining WLE in research
  - To help its users apply the calculation method on their own data
- Includes
  - Excel-based computational templates
  - Examples

Working life expectancy (WLE) and Working years lost (WYL)

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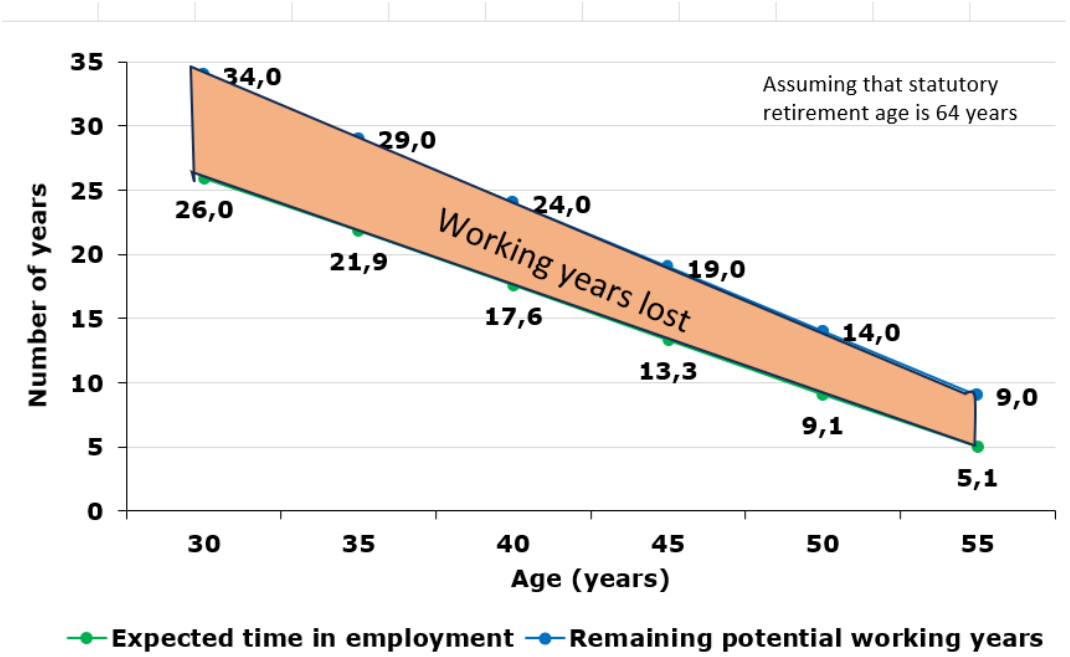
- WLE and WYL - summary measure in a working population
- WLE - indicates the future time that a person at a given age is expected to be in working life (during specified age range)
- WYL - indicates the future time that a person at a given age is expected to be not working (during specified age range)



Source: Nurminen M 2012 Finnish Centre for Pensions report

Between age 30 and 64 person living in Finland in 2005 was expected to be employed for 26 years and expected to be not working for 8 years

Healthy working life expectancy (HWLE)

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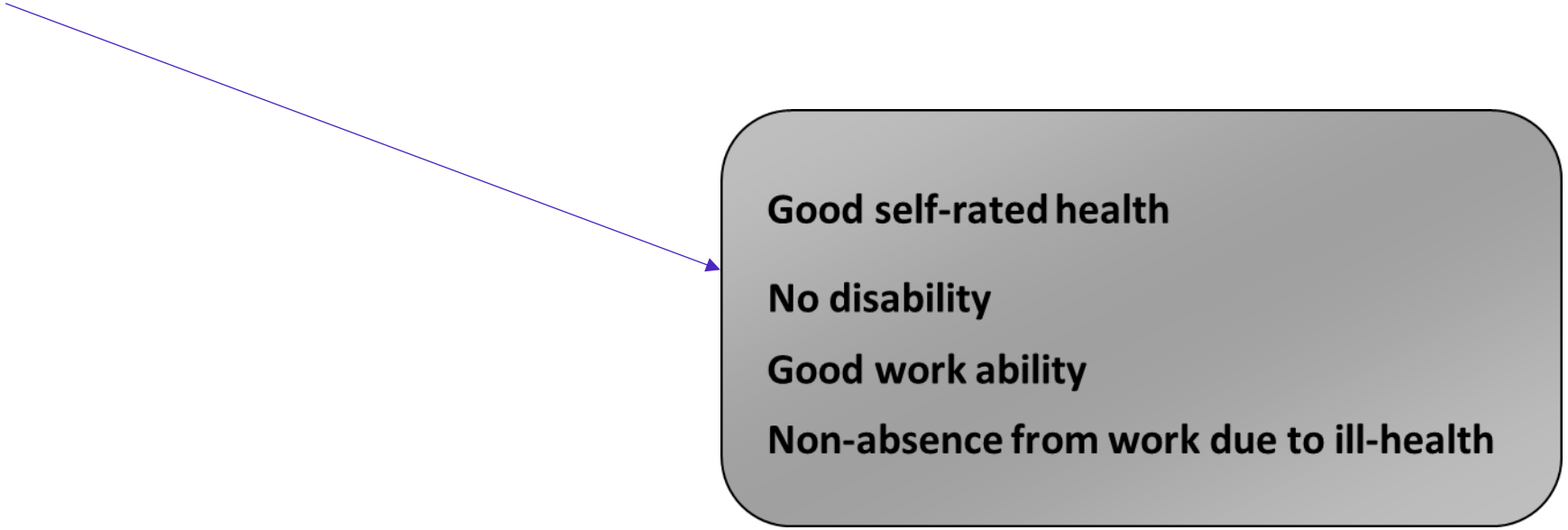
HWLE - indicates the future time that a person at a given age is expected to work and be “healthy”



Why do we need WLE/HWLE?

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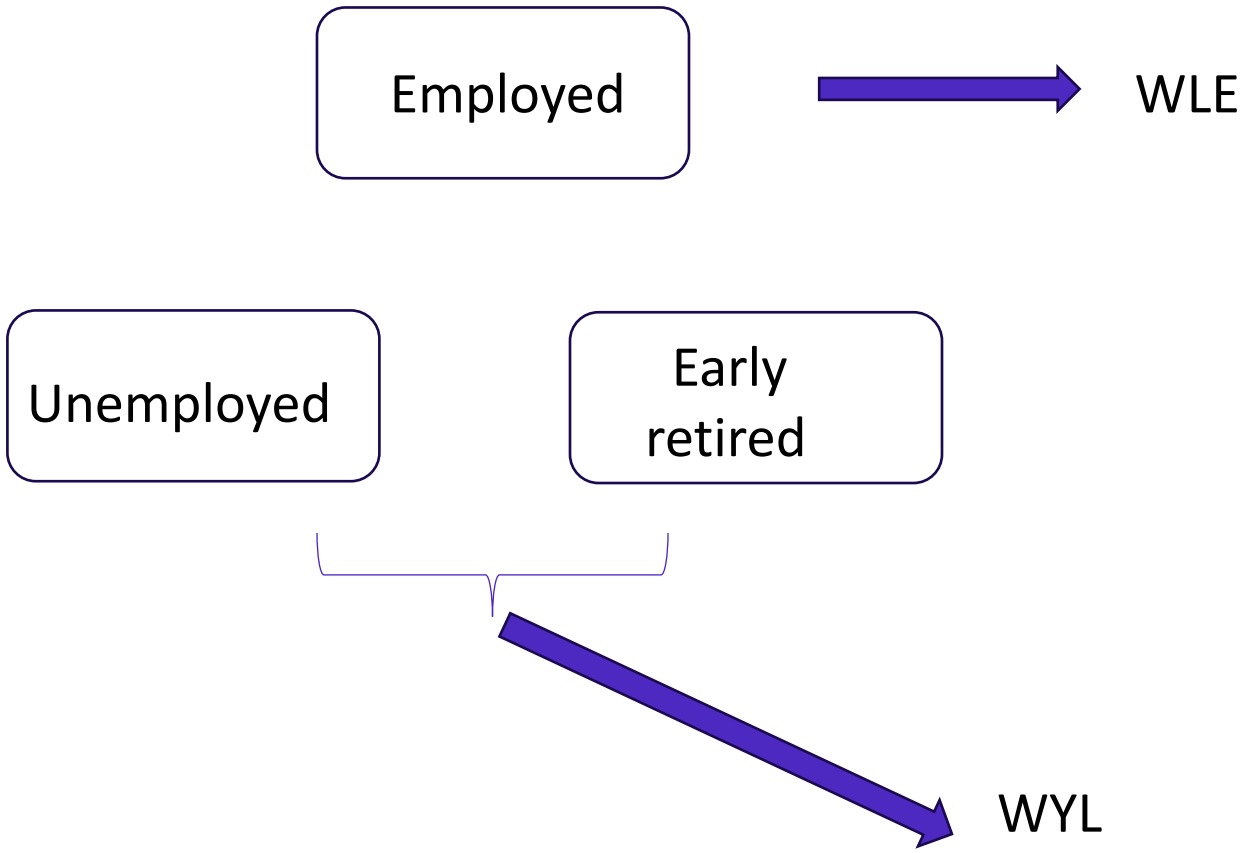
- What would WLE/HWLE be used for?
  - Monitor changes over time (within and between the countries, within specific groups)
  - Examine factor influencing on WLE/HWLE/WYL (e.g., education, occupation, exposures, chronic diseases)
  - Outcome measure in population level interventions
  - Economical evaluations

- For whom it might be useful?
  - Decision makers

States of interest for WLE calculation. Example



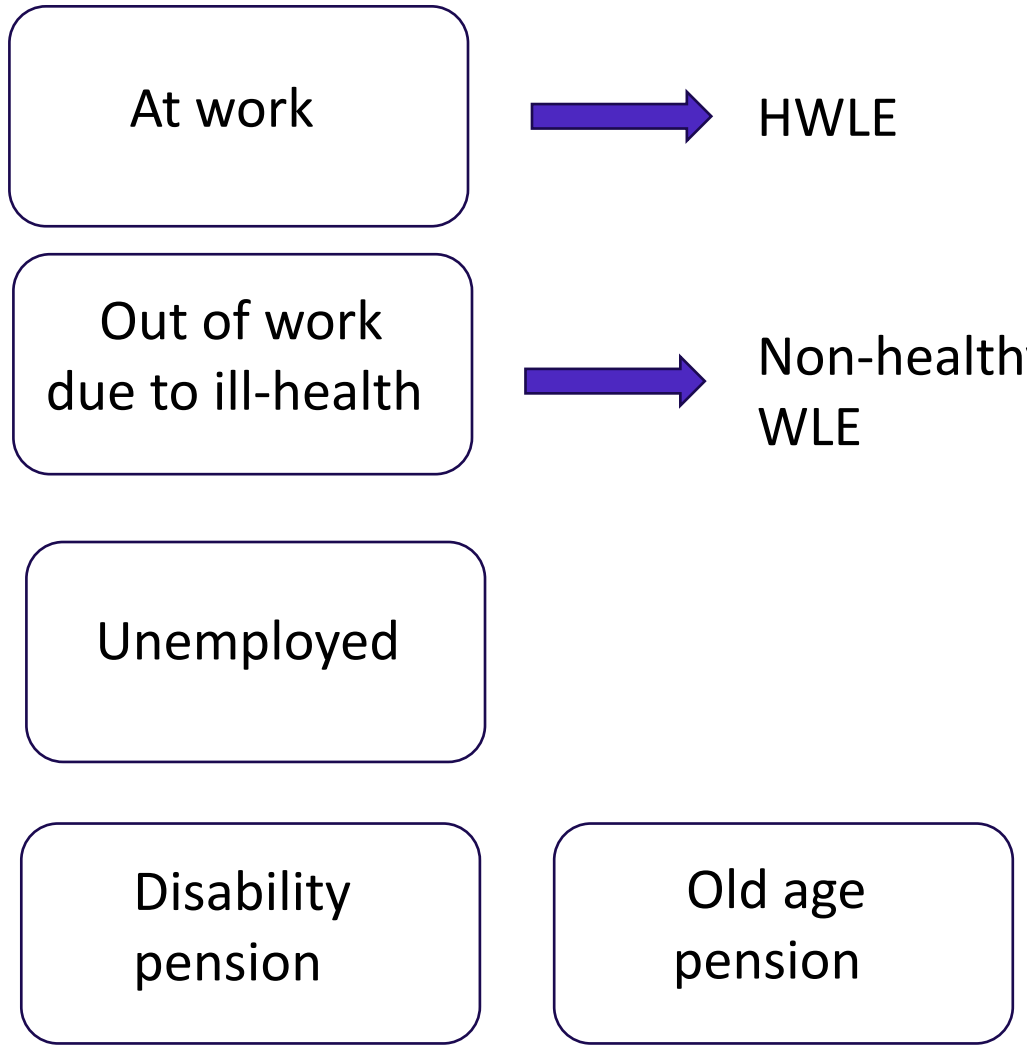
Data needed for each age interval (e.g. 1-year, 5-year interval)

1) Proportion of employed people
2) Proportion of unemployed people
3) Proportion of early retired people
4) Mortality rate

Data collected for fixed period, e.g. one year

Values from 1) to 3) should sum up to 1

States of interest for HWLE calculation. Example



Data needed

1) Proportion of people who are employed and healthy/non-absent from work due to ill-health/good work ability
2) Proportion of people who are employed but not healthy/absent from work due to ill-health/reduced work ability
3) Proportion of unemployed people
4) Proportion of early retired people (on disability or old age-pension)
5) Mortality rate

Data collected for fixed period, e.g. one year

Values from 1) to 4) should sum up to 1

How does the tool work?

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Different templates depending on the number of states

Starting point

- Decide what are you going to calculate WLE or HWLE
- Define number of states of interest (depending on research question and available input data)
- Select age range for calculations

Excel-based computational template

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Age	Mortality rate	Proportion on disability pension	Proportion at work	Proportion of employed but absent from work	Proportion of unemployed	Proportion on old-age pension	Proportion in other states	Expected years lost due to disability pension	Expected years of work (HWLE)	Expected years of non-healthy WLE	Expected years lost due to unemployment	Expected years lost due to old age pension	Expected years lost due to other reasons		Disability pension	HWLE	Non-healthy WLE	Unemployment	Old age pension	Other
	User input	User input	User input	User input	User input	User input	User input	Years	Years	Years	Years	Years	Years		Share	Share	Share	Share	Share	Share
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Excel-based computational template

EPHOR Exposome tools for a healthy working life

Age	rate	pension	work	work	yed	Proportion on old-age pension	Proportion in other states	Expected years lost due to disability pension	Expected years of work (HWLE)	Expected years of non-healthy WLE	Expected years lost due to unemployment	Expected years lost due to old age pension	Expected years lost due to other reasons		Disability pension	HWLE	Non-healthy WLE	Unemployment	Old age pension	Other
	User input	User input	User input	User input	User input	User input	User input	Years	Years	Years	Years	Years	Years		Share	Share	Share	Share	Share	Share
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Age range for calculation

For WLE between age 30 and 65 years
Range of age axis: 30-64

For WLE between age 50 and 68 years
Range of age axis: 50-67

Excel-based computational template

EPHOR Exposome tools for a healthy working life

Age	Mortality rate	Proportion on disability pension	Proportion at work	Proportion of employed but absent from work	Proportion of unemployed	Proportion on old-age pension	Proportion in other states	Expected years lost due to disability pension	Expected years of work (HWLE)	Expected years of non-healthy WLE	Expected years lost due to unemployment	Expected years lost due to old age pension	Expected years lost due to other reasons		Disability pension	HWLE	Non-healthy WLE	Unemployment	Old age pension	Other
	User input	User input	User input	User input	User input	User input	User input	Years	Years	Years	Years	Years	Years		Share	Share	Share	Share	Share	Share
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Area for input data
For each age interval
Number of columns depends on number of states

Excel-based computational template

EPHOR Exposome tools for a healthy working life

Age	Mortality rate	Proportion on disability pension	Proportion at work	Proportion of employed but absent from work	Proportion of unemployed	Proportion on old-age pension	Proportion in other states	Expected years lost due to disability pension	Expected years of work (HWLE)	Expected years of non-healthy WLE	Expected years lost due to unemployment	Expected years lost due to old age pension	Expected years lost due to other reasons		Disability pension	HWLE	Non-healthy WLE	Unemployment	Old age pension	Other
	User input	User input	User input	User input	User input	User input	User input	Years	Years	Years	Years	Years	Years		Share	Share	Share	Share	Share	Share
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R E S U L T S

Calculations are made for each year in selected age range

e.g., if we want to calculate WLE at age 30, the calculations for each age year between 30 and 65 will be made

Possible sources of input data

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- ✓ Official statistics
- ✓ Registers
- ✓ Representative population surveys

Calculation example: HWLE in 2016 among Finnish men between age 50-65 years

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Age	Mortality rate	Proportion on disability pension	Proportion at work	n of employed but absent from	Proportion of unemployed	Proportion on old-age pension	Proportion in other states	Expected years lost due to disability pension	Expected years of work (HWLE)	Expected years of non-healthy WLE	Expected years lost due to unemployment	Expected years lost due to old age pension	Expected years lost due to other reasons
50	0,0030525	,05726	,76644	0,02561	,11194	,00060	0,0382	1,57053	8,7502	0,30796	1,68564	1,13226	0,98803
51	0,0036197	,06158	,75541	0,02481	,11880	,00024	0,0392	1,51799	8,00934	0,28325	1,57868	1,13513	0,95284
52	0,0036336	,06394	,75204	0,0248	,11847	,00355	0,0372	1,4618	7,28161	0,25942	1,46539	1,139	0,91706
53	0,0038317	,06926	,73345	0,01448	,11800	,00627	0,0585	1,40306	6,55471	0,23552	1,35204	1,13959	0,88313
54	0,0044539	,07082	,72483	0,02842	,11662	,00914	0,0502	1,33906	5,84501	0,22192	1,23901	1,13768	0,82786
55	0,0047941	,07858	,70804	0,03004	,12368	,01074	0,0489	1,27406	5,14466	0,19442	1,12766	1,1336	0,78127
56	0,0061791	,09115	,69384	0,02807	,12525	,01238	0,0493	1,20141	4,45964	0,16525	1,0091	1,12828	0,73598
57	0,0068145	,11204	,66872	0,03008	,13077	,01297	0,0454	1,11742	3,79129	0,13811	0,88971	1,12286	0,69106
58	0,0068405	,12581	,65785	0,02831	,12227	,01453	0,0512	1,01264	3,14621	0,10887	0,76458	1,11752	0,65022
59	0,0083607	,13143	,61795	0,02407	,12745	,01641	0,0827	0,89335	2,50769	0,08121	0,64714	1,11061	0,60329
60	0,0082283	,16087	,57338	0,02629	,13652	,02124	0,0817	0,76887	1,9082	0,05773	0,52459	1,10346	0,52532
61	0,0095358	,18231	,49072	0,01177	,17514	,03839	0,1017	0,61369	1,34822	0,0318	0,39184	1,09125	0,44761
62	0,0106361	,20176	,43719	0,01044	,16133	,09570	0,0936	0,43638	0,86807	0,02028	0,21961	1,06313	0,34974
63	0,0110707	,15687	,29412	0,00807	,06010	,35334	0,1275	0,23821	0,43782	0,01	0,05977	0,97829	0,25939
64	0,0136125	,08312	,14694	0,002	,00000	,63387	0,1341	0,08312	0,14694	0,002	-2,5E-13	0,63387	0,13406

Age	Disability pension	HWLE	Non-healthy WLE	Unemployment	Old age pension	Other
50	10,9%	60,6%	2,1%	11,7%	7,8%	6,8%
51	11,3%	59,4%	2,1%	11,7%	8,4%	7,1%
52	11,7%	58,1%	2,1%	11,7%	9,1%	7,3%
53	12,1%	56,7%	2,0%	11,7%	9,9%	7,6%
54	12,6%	55,1%	2,1%	11,7%	10,7%	7,8%
55	13,2%	53,3%	2,0%	11,7%	11,7%	8,1%
56	13,8%	51,3%	1,9%	11,6%	13,0%	8,5%
57	14,4%	48,9%	1,8%	11,5%	14,5%	8,9%
58	14,9%	46,3%	1,6%	11,2%	16,4%	9,6%
59	15,3%	42,9%	1,4%	11,1%	19,0%	10,3%
60	15,7%	39,0%	1,2%	10,7%	22,6%	10,7%
61	15,6%	34,4%	0,8%	10,0%	27,8%	11,4%
62	14,8%	29,4%	0,7%	7,4%	36,0%	11,8%
63	12,0%	22,1%	0,5%	3,0%	49,3%	13,1%
64	8,3%	14,7%	0,2%	0,0%	63,4%	13,4%

Calculation example: HWLE in 2016 among Finnish men between age 50-65 years

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Age	Mortality rate	Proportion on disability pension	Proportion at work	n of employed but absent from	Proportion of unemployed	Proportion on old-age pension	Proportion in other states	Expected years lost due to disability pension	Expected years of work (HWLE)	Expected years of non-healthy WLE	Expected years lost due to unemployment	Expected years lost due to old age pension	Expected years lost due to other reasons		Disability pension	HWLE	Non-healthy WLE	Unemployment	Old age pension	Other
50	0,0030525	,05726	,76644	0,02561	,11194	,00060	0,0382	1,57053	8,7502	0,30796	1,68564	1,13226	0,98803		10,9%	60,6%	2,1%	11,7%	7,8%	6,8%
51	0,0036197	,06158	,75541	0,02481	,11880	,00024	0,0392	1,51799	8,00934	0,28325	1,57868	1,13513	0,95284		11,3%	59,4%	2,1%	11,7%	8,4%	7,1%
52	0,0036336															58,1%	2,1%	11,7%	9,1%	7,3%
53	0,0038317															56,7%	2,0%	11,7%	9,9%	7,6%
54	0,0044539	,07082	,72483	0,02842	,11662	,00914	0,0502	1,33906	5,84501	0,22192	1,23901	1,13768	0,82786		12,6%	55,1%	2,1%	11,7%	10,7%	7,8%
55	0,0047941	,07858	,70804	0,03004	,12368	,01074	0,0489	1,27406	5,14466	0,19442	1,12766	1,1336	0,78127		13,2%	53,3%	2,0%	11,7%	11,7%	8,1%
56	0,0061791	,09115	,69384	0,02807	,12525	,01238	0,0493	1,20141	4,45964	0,16525	1,0091	1,12828	0,73598		13,8%	51,3%	1,9%	11,6%	13,0%	8,5%
57	0,0068145	,11204	,66872	0,03008	,13077	,01297	0,0454	1,11742	3,79129	0,13811	0,88971	1,12286	0,69106		14,4%	48,9%	1,8%	11,5%	14,5%	8,9%
58	0,0068405	,12581	,65785	0,02831	,12227	,01453	0,0512	1,01264	3,14621	0,10887	0,76458	1,11752	0,65022		14,9%	46,3%	1,6%	11,2%	16,4%	9,6%
59	0,0083607	,13143	,61795	0,02407	,12745	,01641	0,0827	0,89335	2,50769	0,08121	0,64714	1,11061	0,60329		15,3%	42,9%	1,4%	11,1%	19,0%	10,3%
60	0,0082283	,16087	,57338	0,02629	,13652	,02124	0,0817	0,76887	1,9082	0,05773	0,52459	1,10346	0,52532		15,7%	39,0%	1,2%	10,7%	22,6%	10,7%
61	0,0095358	,18231	,49072	0,01177	,17514	,03839	0,1017	0,61369	1,34822	0,0318	0,39184	1,09125	0,44761		15,6%	34,4%	0,8%	10,0%	27,8%	11,4%
62	0,0106361	,20176	,43719	0,01044	,16133	,09570	0,0936	0,43638	0,86807	0,02028	0,21961	1,06313	0,34974		14,8%	29,4%	0,7%	7,4%	36,0%	11,8%
63	0,0110707	,15687	,29412	0,00807	,06010	,35334	0,1275	0,23821	0,43782	0,01	0,05977	0,97829	0,25939		12,0%	22,1%	0,5%	3,0%	49,3%	13,1%
64	0,0136125	,08312	,14694	0,002	,00000	,63387	0,1341	0,08312	0,14694	0,002	-2,5E-13	0,63387	0,13406		8,3%	14,7%	0,2%	0,0%	63,4%	13,4%

$$\sum (0{,}05726;\ 0{,}76644;\ 0{,}02561;\ 0{,}11194;\ 0{,}00060;\ 0{,}0382) = 1{,}0000$$

Calculation example: HWLE in 2016 among Finnish men between age 30-65 years

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Age	Mortality rate	Proportion on disability pensio	Proportion at work	Proportion of employed but absent	Proportion of unemployed	Proportion on old-age pensio	Proportion in other states	Expected years lost due to	Expected years of work	Expected years of non-healthy	Expected years lost due to	Expected years lost due to	Expected years lost due to		Disability pension	HWLE	Non-healthy WLE	Unemployment	Old age pension	Other
	User input	User input	User input	User input	User input	User input	User input	Years	Years	Years	Years	Years	Years		Share	Share	Share	Share	Share	Share
30	0,000775	,01656	,76970	0,0214	,13680	,00000	0,0555	2,081	24,255	0,7088	3,9159	1,1009	1,7333		6,2%	71,8%	2,1%	11,6%	3,3%	5,1%
31	0,000666	,01754	,76700	0,01941	,13486	,00000	0,0612	2,0661	23,503	0,6879	3,7821	1,1018	1,679		6,3%	71,6%	2,1%	11,5%	3,4%	5,1%
32	0,000883	,01889	,78667	0,02101	,13015	,00001	0,0433	2,0499	22,752	0,669	3,6497	1,1025	1,6189		6,4%	71,5%	2,1%	11,5%	3,5%	5,1%
33	0,00073	,02061	,78934	0,01987	,12746	,00000	0,0427	2,0328	21,985	0,6485	3,5227	1,1035	1,5771		6,6%	71,2%	2,1%	11,4%	3,6%	5,1%
34	0,001093	,02033	,79743	0,01411	,11154	,00000	0,0566	2,0137	21,211	0,6291	3,3978	1,1043	1,5355		6,7%	71,0%	2,1%	11,4%	3,7%	5,1%
35	0,000552	,02138	,80616	0,0204	,11777	,00000	0,0343	1,9956	20,437	0,6157	3,2899	1,1055	1,4806		6,9%	70,7%	2,1%	11,4%	3,8%	5,1%
36	0,000731	,02160	,80737	0,02098	,11365	,00000	0,0364	1,9753	19,642	0,5956	3,1739	1,1061	1,4471		7,1%	70,3%	2,1%	11,4%	4,0%	5,2%
37	0,001394	,02353	,81540	0,02137	,11034	,00000	0,0294	1,9551	18,848	0,5751	3,0625	1,1069	1,4117		7,3%	69,9%	2,1%	11,4%	4,1%	5,2%
38	0,001225	,02641	,81326	0,01981	,10868	,00000	0,0318	1,9343	18,059	0,5545	2,9564	1,1084	1,3843		7,4%	69,5%	2,1%	11,4%	4,3%	5,3%
39	0,001044	,02706	,81648	0,01927	,10716	,00000	0,0300	1,9102	17,267	0,5354	2,8512	1,1098	1,3542		7,6%	69,0%	2,1%	11,4%	4,4%	5,4%
40	0,000841	,02817	,81633	0,02021	,10724	,00000	0,0281	1,8852	16,468	0,5166	2,747	1,1109	1,3255		7,8%	68,5%	2,1%	11,4%	4,6%	5,5%
41	0,001206	,02916	,81665	0,02029	,10463	,00004	0,0292	1,8586	15,665	0,4968	2,642	1,1119	1,2986		8,1%	67,9%	2,2%	11,5%	4,8%	5,6%
42	0,001309	,03091	,80903	0,01891	,10963	,00000	0,0315	1,8316	14,867	0,4771	2,5405	1,1132	1,2709		8,3%	67,3%	2,2%	11,5%	5,0%	5,8%
43	0,001601	,03597	,79959	0,02309	,10478	,00004	0,0365	1,8031	14,077	0,4588	2,4341	1,1146	1,241		8,5%	66,6%	2,2%	11,5%	5,3%	5,9%
44	0,002272	,03881	,80165	0,01831	,11177	,00000	0,0295	1,77	13,299	0,4365	2,3332	1,1164	1,2065		8,8%	66,0%	2,2%	11,6%	5,5%	6,0%
45	0,002243	,04076	,79620	0,02223	,10762	,00016	0,0330	1,7352	12,527	0,4191	2,2266	1,1189	1,1797		9,0%	65,2%	2,2%	11,6%	5,8%	6,1%
46	0,003162	,02458	,78408	0,02418	,11442	,00042	0,0523	1,6982	11,758	0,3978	2,1239	1,1213	1,1493		9,3%	64,4%	2,2%	11,6%	6,1%	6,3%
47	0,002524	,03183	,78230	0,01952	,11800	,00039	0,0480	1,679	11,01	0,3749	2,016	1,1244	1,1005		9,7%	63,6%	2,2%	11,6%	6,5%	6,4%
48	0,002718	,03892	,78241	0,0243	,11688	,00037	0,0371	1,6514	10,254	0,3563	1,9029	1,1269	1,0553		10,1%	62,7%	2,2%	11,6%	6,9%	6,5%
49	0,002978	,05111	,77579	0,0259	,11060	,00066	0,0360	1,6169	9,4988	0,3329	1,7911	1,1296	1,021		10,5%	61,7%	2,2%	11,6%	7,3%	6,6%
50	0,003053	,05726	,76644	0,02561	,11194	,00060	0,0382	1,5705	8,7502	0,308	1,6856	1,1323	0,988		10,9%	60,6%	2,1%	11,7%	7,8%	6,8%
51	0,00362	,06158	,75541	0,02481	,11880	,00024	0,0392	1,518	8,0093	0,2832	1,5787	1,1351	0,9528		11,3%	59,4%	2,1%	11,7%	8,4%	7,1%
52	0,003634	,06394	,75204	0,0248	,11847	,00355	0,0372	1,4618	7,2816	0,2594	1,4654	1,139	0,9171		11,7%	58,1%	2,1%	11,7%	9,1%	7,3%
53	0,003832	,06926	,73345	0,01448	,11800	,00627	0,0585	1,4031	6,5547	0,2355	1,352	1,1396	0,8831		12,1%	56,7%	2,0%	11,7%	9,9%	7,6%
54	0,004454	,07082	,72483	0,02842	,11662	,00914	0,0502	1,3391	5,845	0,2219	1,239	1,1377	0,8279		12,6%	55,1%	2,1%	11,7%	10,7%	7,8%
55	0,004794	,07858	,70804	0,03004	,12368	,01074	0,0489	1,2741	5,1447	0,1944	1,1277	1,1336	0,7813		13,2%	53,3%	2,0%	11,7%	11,7%	8,1%
56	0,006179	,09115	,69384	0,02807	,12525	,01238	0,0493	1,2014	4,4596	0,1652	1,0091	1,1283	0,736		13,8%	51,3%	1,9%	11,6%	13,0%	8,5%
57	0,006814	,11204	,66872	0,03008	,13077	,01297	0,0454	1,1174	3,7913	0,1381	0,8897	1,1229	0,6911		14,4%	48,9%	1,8%	11,5%	14,5%	8,9%
58	0,00684	,12581	,65785	0,02831	,12227	,01453	0,0512	1,0126	3,1462	0,1089	0,7646	1,1175	0,6502		14,9%	46,3%	1,6%	11,2%	16,4%	9,6%
59	0,008361	,13143	,61795	0,02407	,12745	,01641	0,0827	0,8934	2,5077	0,0812	0,6471	1,1106	0,6033		15,3%	42,9%	1,4%	11,1%	19,0%	10,3%
60	0,008228	,16087	,57338	0,02629	,13652	,02124	0,0817	0,7689	1,9082	0,0577	0,5246	1,1035	0,5253		15,7%	39,0%	1,2%	10,7%	22,6%	10,7%
61	0,009536	,18231	,49072	0,01177	,17514	,03839	0,1017	0,6137	1,3482	0,0318	0,3918	1,0912	0,4476		15,6%	34,4%	0,8%	10,0%	27,8%	11,4%
62	0,010636	,20176	,43719	0,01044	,16133	,09570	0,0936	0,4364	0,8681	0,0203	0,2196	1,0631	0,3497		14,8%	29,4%	0,7%	7,4%	36,0%	11,8%
63	0,011071	,15687	,29412	0,00807	,06010	,35334	0,1275	0,2382	0,4378	0,01	0,0598	0,9783	0,2594		12,0%	22,1%	0,5%	3,0%	49,3%	13,1%
64	0,013612	,08312	,14694	0,002	,00000	,63387	0,1341	0,0831	0,1469	0,002	-3E-13	0,6339	0,1341		8,3%	14,7%	0,2%	0,0%	63,4%	13,4%

Comparison between the groups

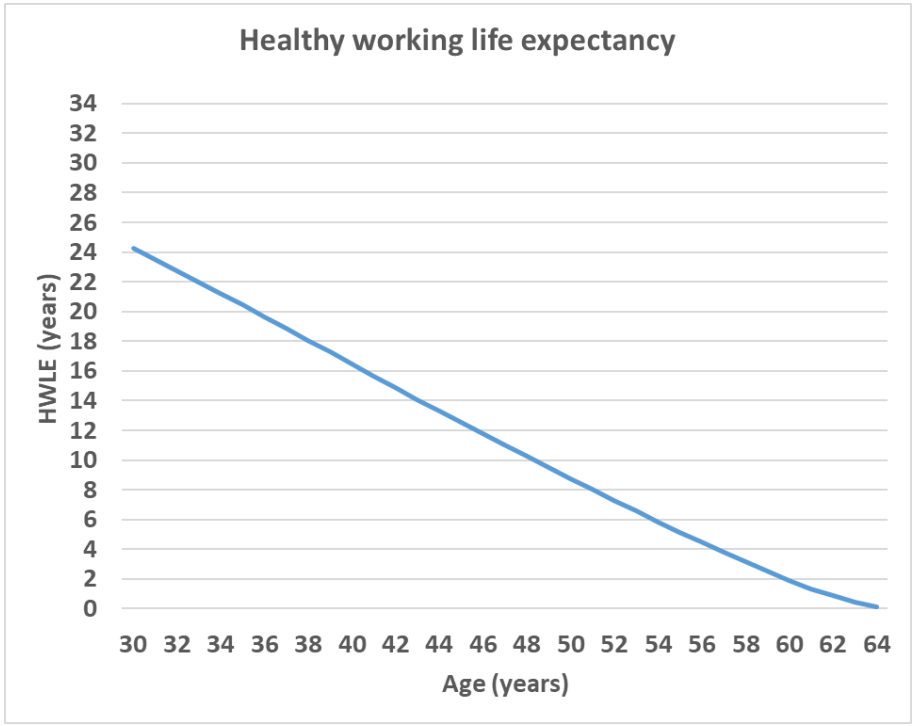
EPHOR Exposome tools for a healthy working life

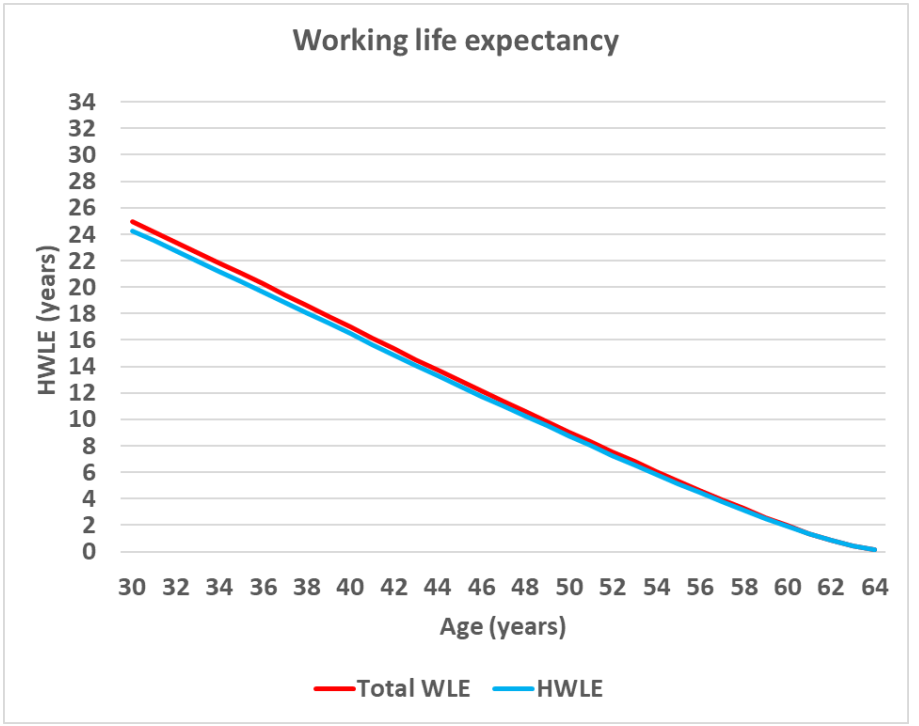
- For each group of interest calculations need to be done separately
- Each group needs own input data

For example:
to compare WLE between manual workers and upper-level employees, two input data matrices are needed, one for manual workers and another for upper-level employees

Visualization of results: Graphs included into template

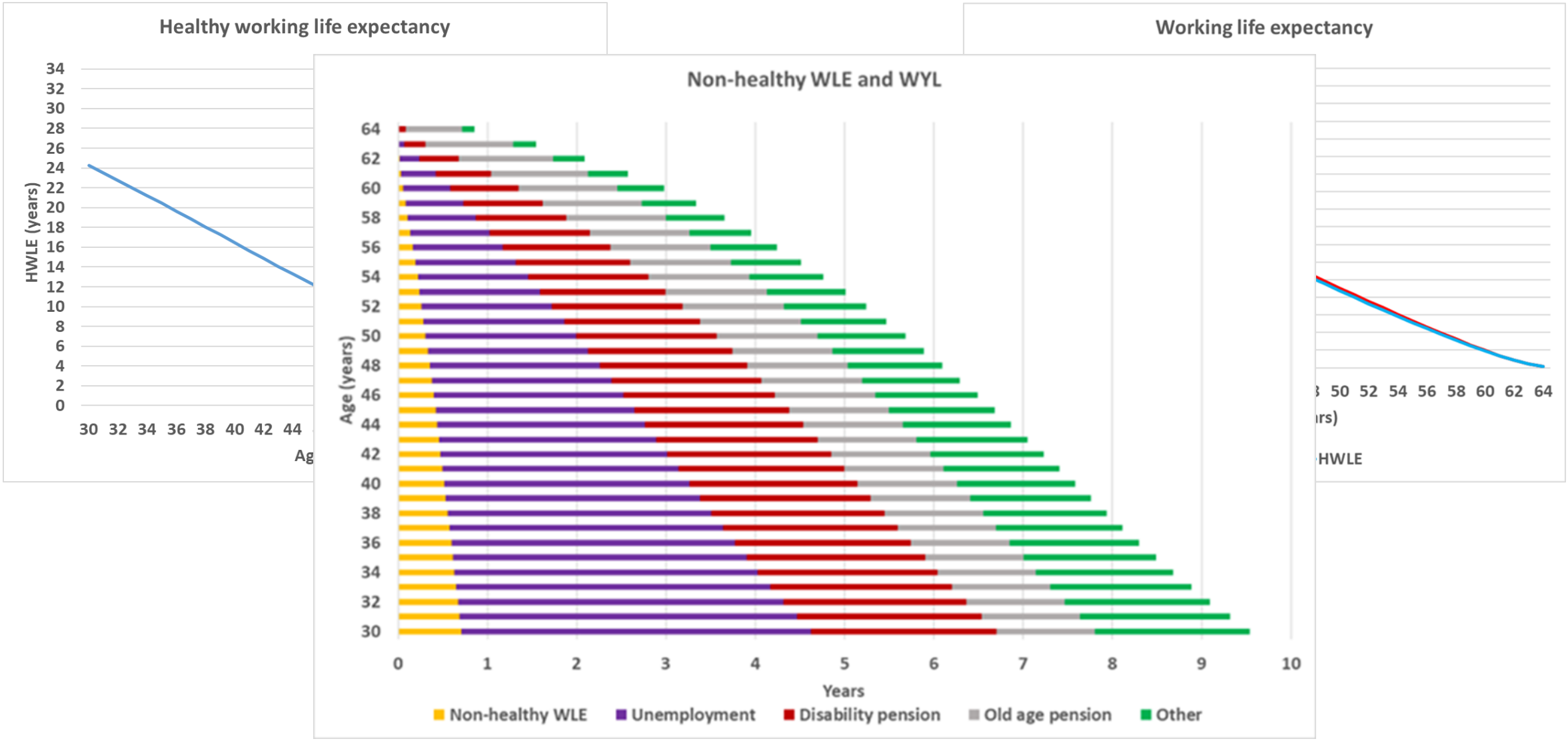
EPHOR Exposome tools for a healthy working life





Visualization of results: Graphs included into template

EPHOR Exposome tools for a healthy working life



Visualization of results: Graphs included into template

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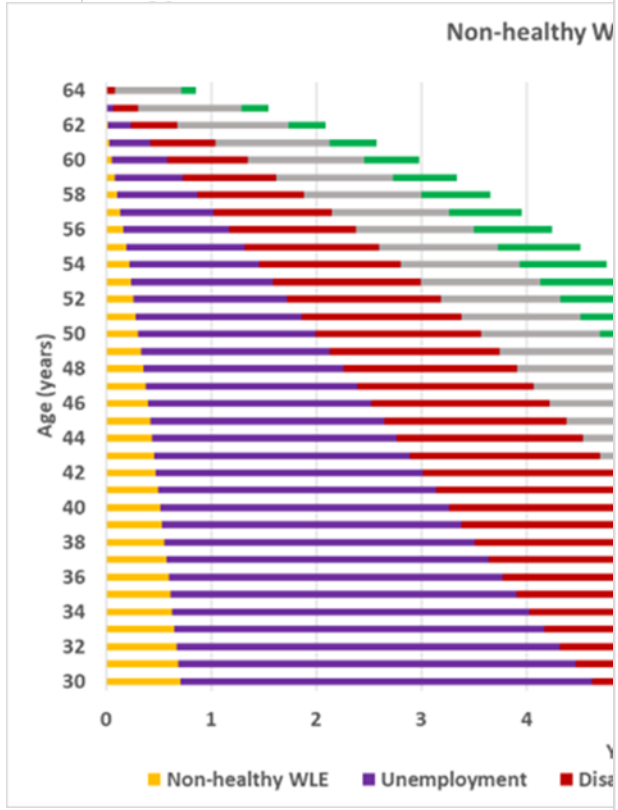
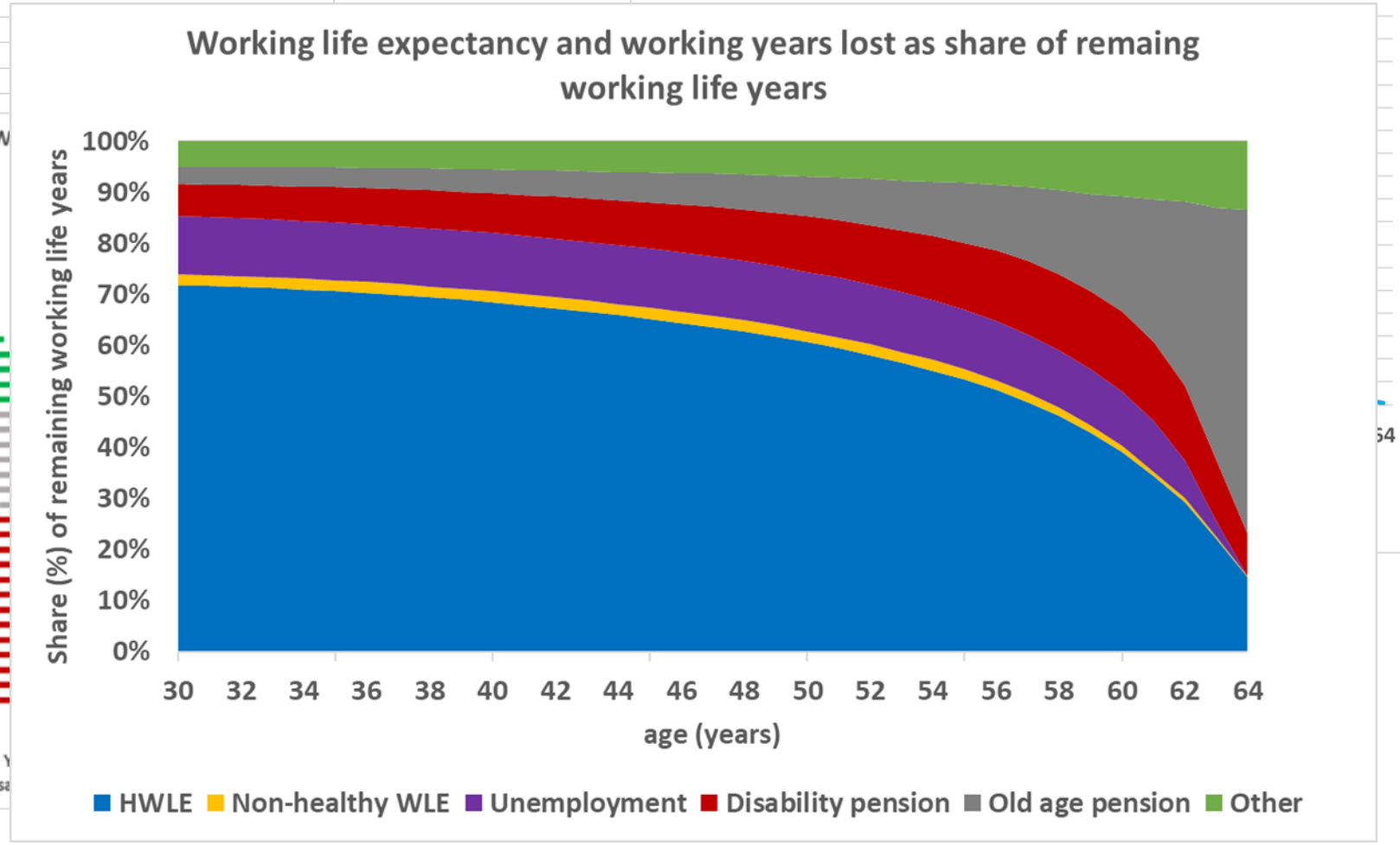
Healthy working life expectancy



Working life expectancy



Summary

EPHOR Exposome tools for a healthy working life

- The tool is primarily made for researchers, but it can be used outside research
- It is aiming to help its users apply the calculation method on their own data
- Input data on mortality rate and proportion of people in each states of interest are needed for each age interval
- Input data can be derived from official statistics, registers or representative population surveys
- It can calculate WLE, HWLE, non-healthy WLE, WYL

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THANKS FOR YOUR ATTENTION

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