KU LEUVEN

idewe
OPTIMISING WORK ENVIRONMENTS

Lang Werken = Lang Leven ?

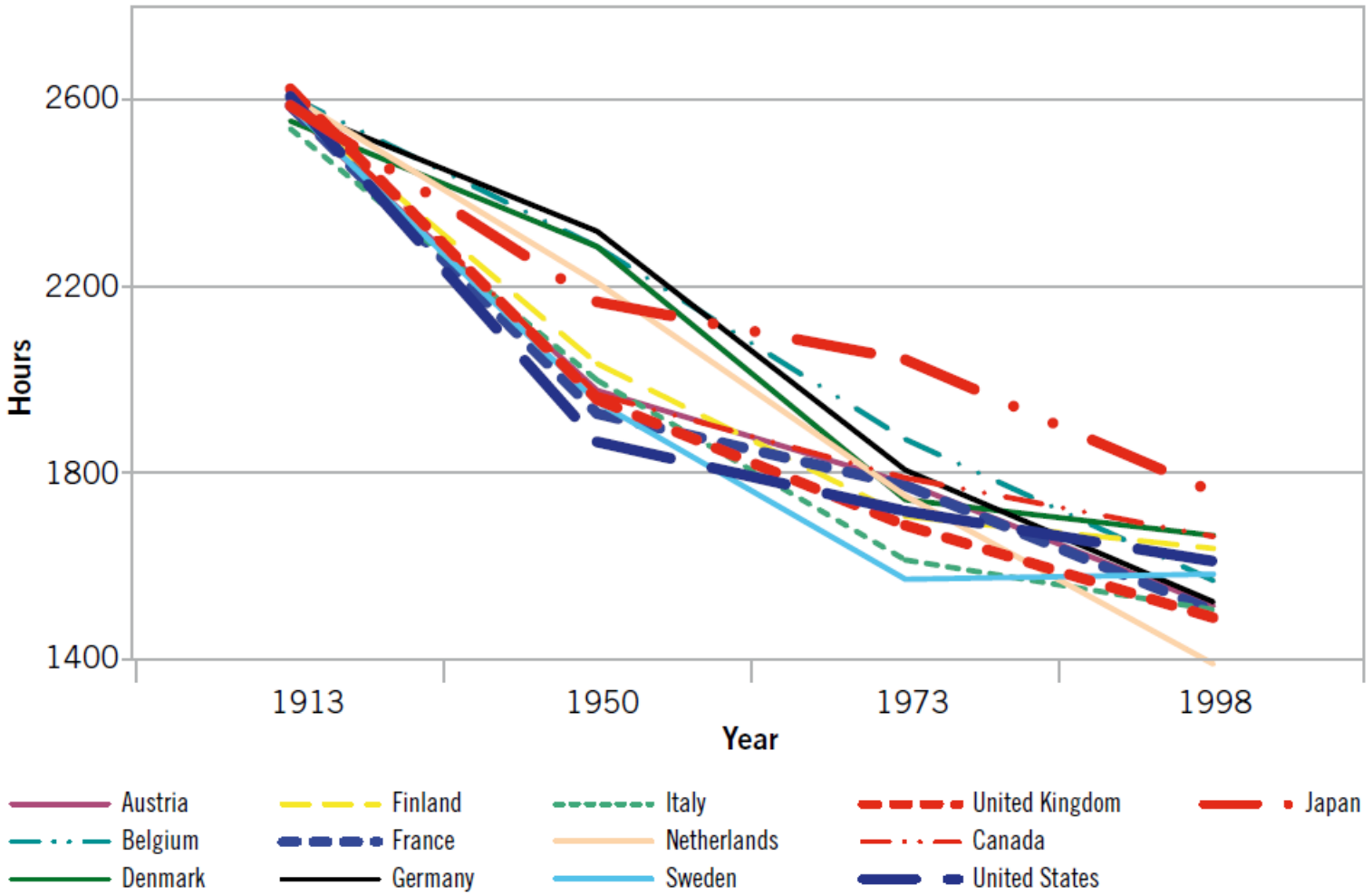
Prof dr. Lode Godderis, Dr. Jian Li, Dr. Reiner Rugulies,
Dr. Grace Sembajwe, Dr. Halim Hamzaoui, Dr. Frank Pega

World Health Organization

International Labour Organization

Risk factor levels and minimum risk exposure level

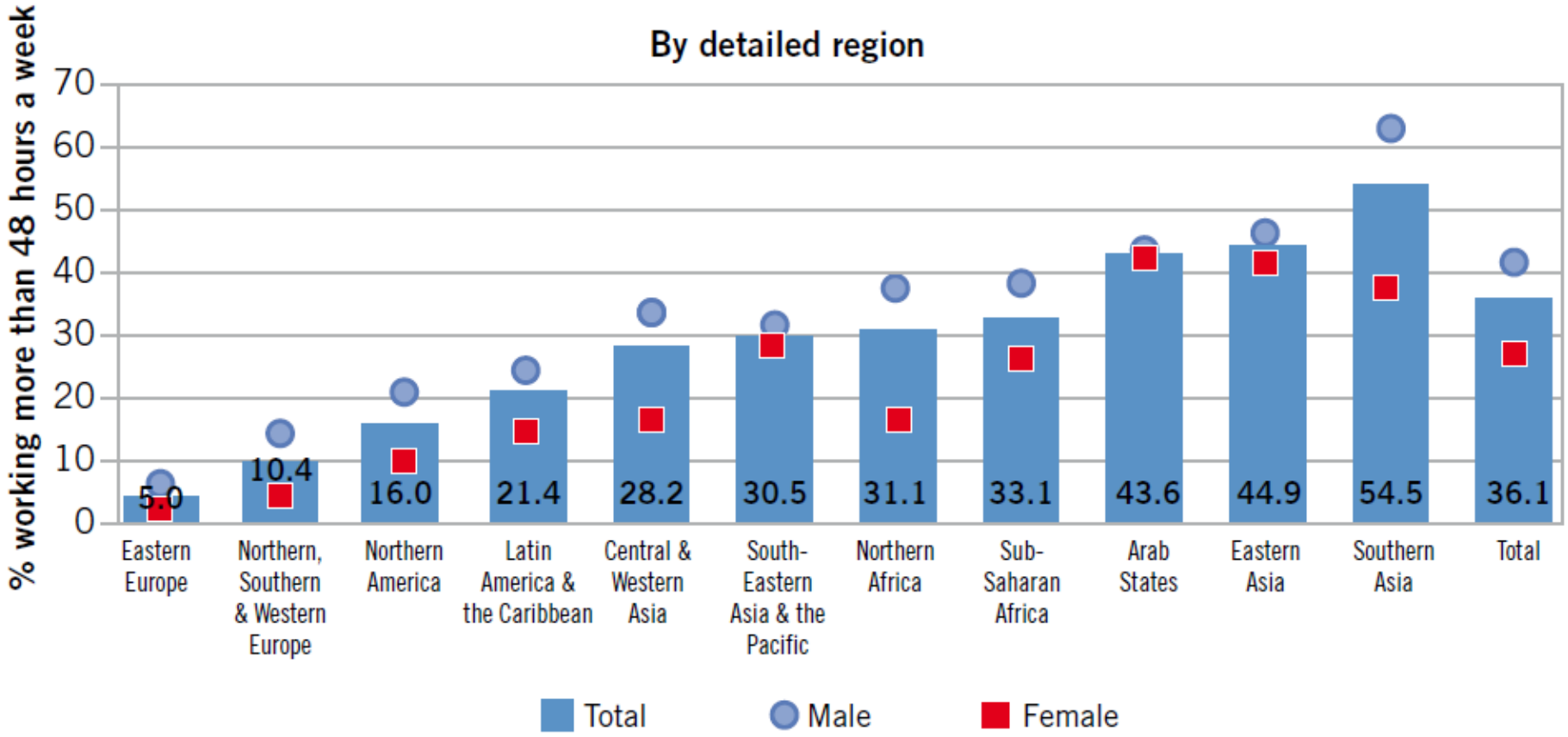
Figure 1. Annual hours worked per person employed, total employment, 20th century



Source: Maddison, 2001, p. 347.

Karoshi and Karojisatsu

Risk factor levels and minimum risk exposure level

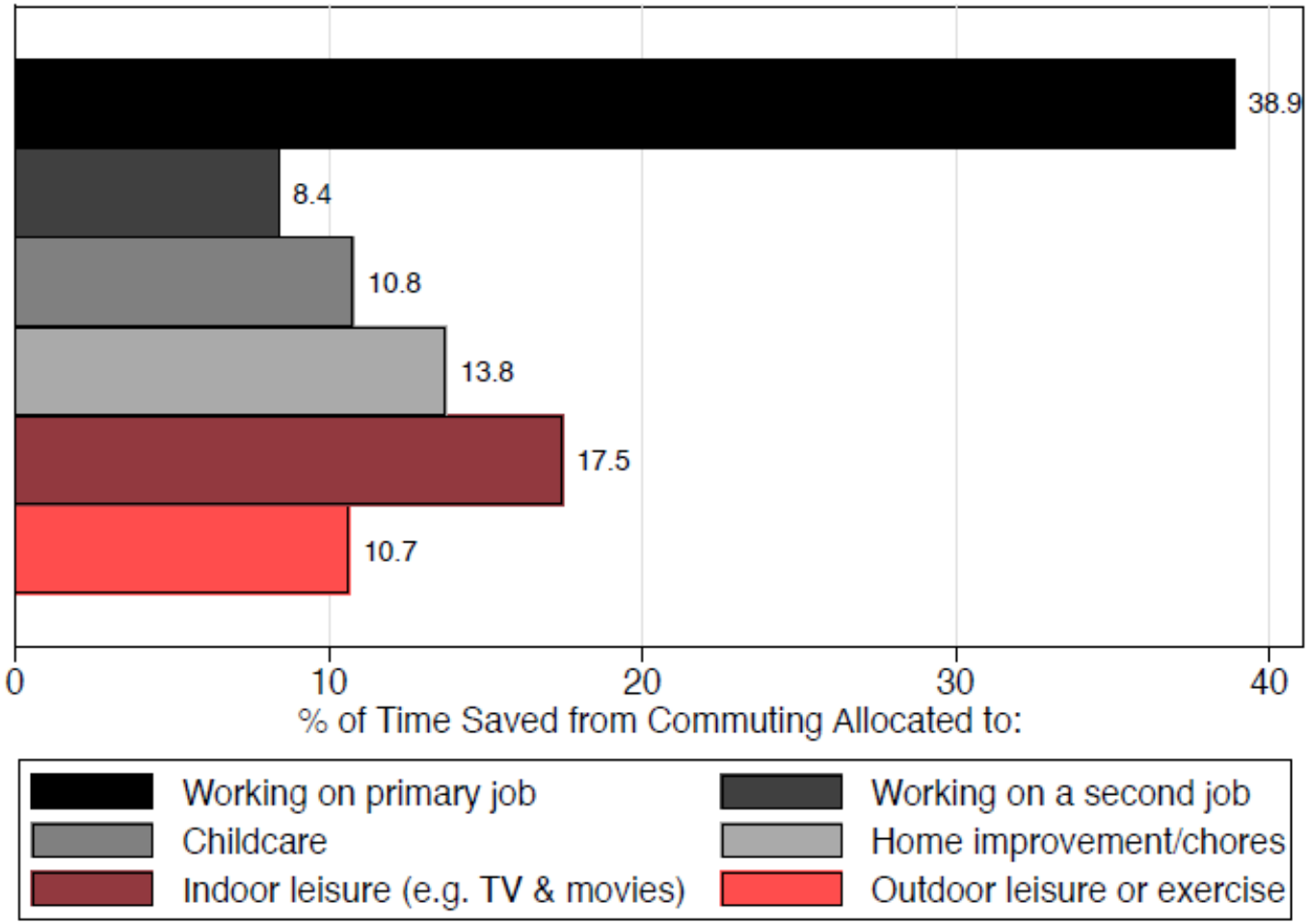


Note: Global estimates based on 131 countries representing 95 per cent of world employment. Data for the latest available year: 2013 or later (mainly 2014–15) for 80 of the countries covered.

** Arab States: the number of countries considered is insufficient to build conclusions on those regional estimates.*

Sources: Bonnet, 2017; ILOSTAT and ILO calculations based on labour force or other nationally representative household survey data.

Telework


38.9
8.4
10.8
13.8
17.5
10.7
0
10
20
30
40
% of Time Saved from Commuting Allocated to:
Working on primary job
Working on a second job
Childcare
Home improvement/chores
Indoor leisure (e.g. TV & movies)
Outdoor leisure or exercise

Risk factor levels and minimum risk exposure level

	Definition
Risk factor	Long working hours (including those spent in secondary jobs), defined as working hours >40 hours/week, i.e. working hours exceeding standard working hours (35-40 hours/week).
Risk factor levels	Four levels: 1. 35-40 hours/week. 2. 41-48 hours/week. 3. 49-54 hours/week. 4. ≥55 hours/week.
Theoretical minimum risk exposure level	Standard working hours, defined as working hours of 35-40 hours/week.

Methods, protocol and registration of the study

Environment International 119 (2018) 366–378

Contents lists available at ScienceDirect

Environment International

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Review article

WHO/ILO work-related burden of disease and injury: Protocol for systematic reviews of exposure to long working hours and of the effect of exposure to long working hours on stroke

Alexis Descatha[a,b,c,*], Grace Sembajwe[d,1], Michael Baer[e], Fabio Boccuni[f], Cristina Di Tecco[e], Clément Duret[g,h,i], Bradley A. Evanoff[f], Diana Gagliardi[f], Ivan D. Ivanov[k], Nancy Leppink[l], Alessandro Marinaccio[f], Linda L. Magnusson Hanson[m], Anna Ozguler[e,n], Frank Pega[k], John Pell[o], Fernando Pico[p], Annette Prüss-Üstün[k], Matteo Ronchetti[f], Yves Roquelaure[q], Erika Sabbath[r], Gretchen A. Stevens[s], Akizumi Tsutsumi[t], Yuka Ujita[l], Sergio Iavicoli[f]

Environment International 119 (2018) 558–569

Contents lists available at ScienceDirect

Environment International

journal homepage: www.elsevier.com/locate/envint

Review article

WHO/ILO work-related burden of disease and injury: Protocol for systematic reviews of exposure to long working hours and of the effect of exposure to long working hours on ischaemic heart disease☆

Jian Li[a,*,1], Chantal Brisson[b], Els Clays[c], Marco M. Ferrario[d], Ivan D. Ivanov[e], Paul Landsbergis[f], Nancy Leppink[g], Frank Pega[e], Hynek Pikhart[h], Annette Prüss-Üstün[e], Reiner Rugulies[i,j,k], Peter L. Schnall[l], Gretchen Stevens[m], Akizumi Tsutsumi[n], Yuka Ujita[g], Johannes Siegrist[o,1]

Environment International 125 (2019) 515–528

Contents lists available at ScienceDirect

Environment International

journal homepage: www.elsevier.com/locate/envint

Review article

WHO/ILO work-related burden of disease and injury: Protocol for systematic reviews of exposure to long working hours and of the effect of exposure to long working hours on depression

Reiner Rugulies[a,b,c,*], Emiko Ando[d], Jose Luis Ayuso-Mateos[e,f,g], Michela Bonafede[h], Maria Cabello[e,f], Cristina Di Tecco[h], Nico Dragano[i], Quentin Durand-Moreau[j,k], Hisashi Eguchi[l], Junling Gao[m], Anne H. Garde[a,b], Sergio Iavicoli[h], Ivan D. Ivanov[n], Nancy Leppink[o], Ida E.H. Madsen[a], Frank Pega[n], Annette M. Prüss-Üstün[n], Bruna M. Rondinone[h], Kathrine Sørensen[a], Kanami Tsuno[p], Yuka Ujita[o], Amy Zadow[q]

Environment International

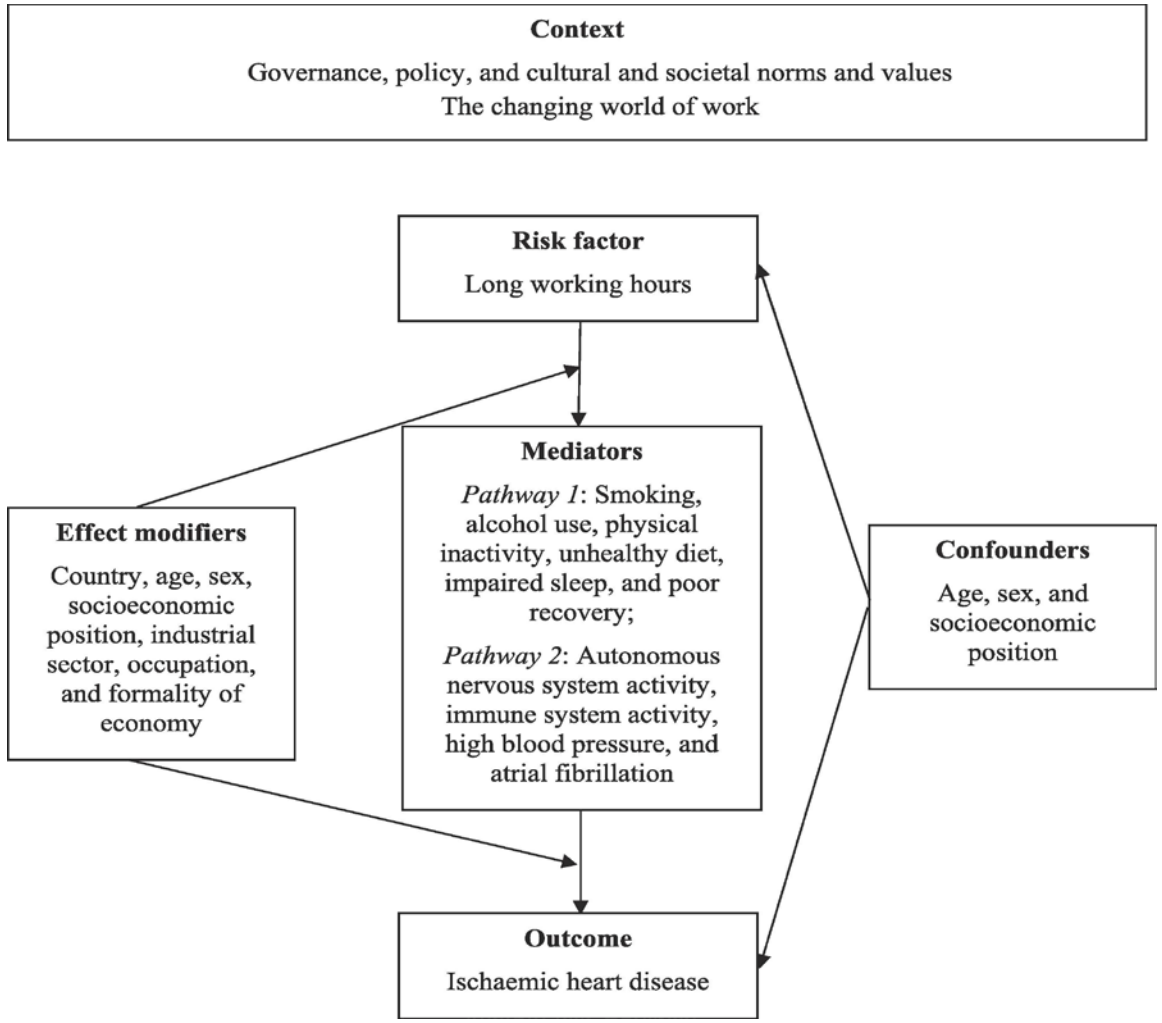
Volume 120, November 2018, Pages 22-33

Review article

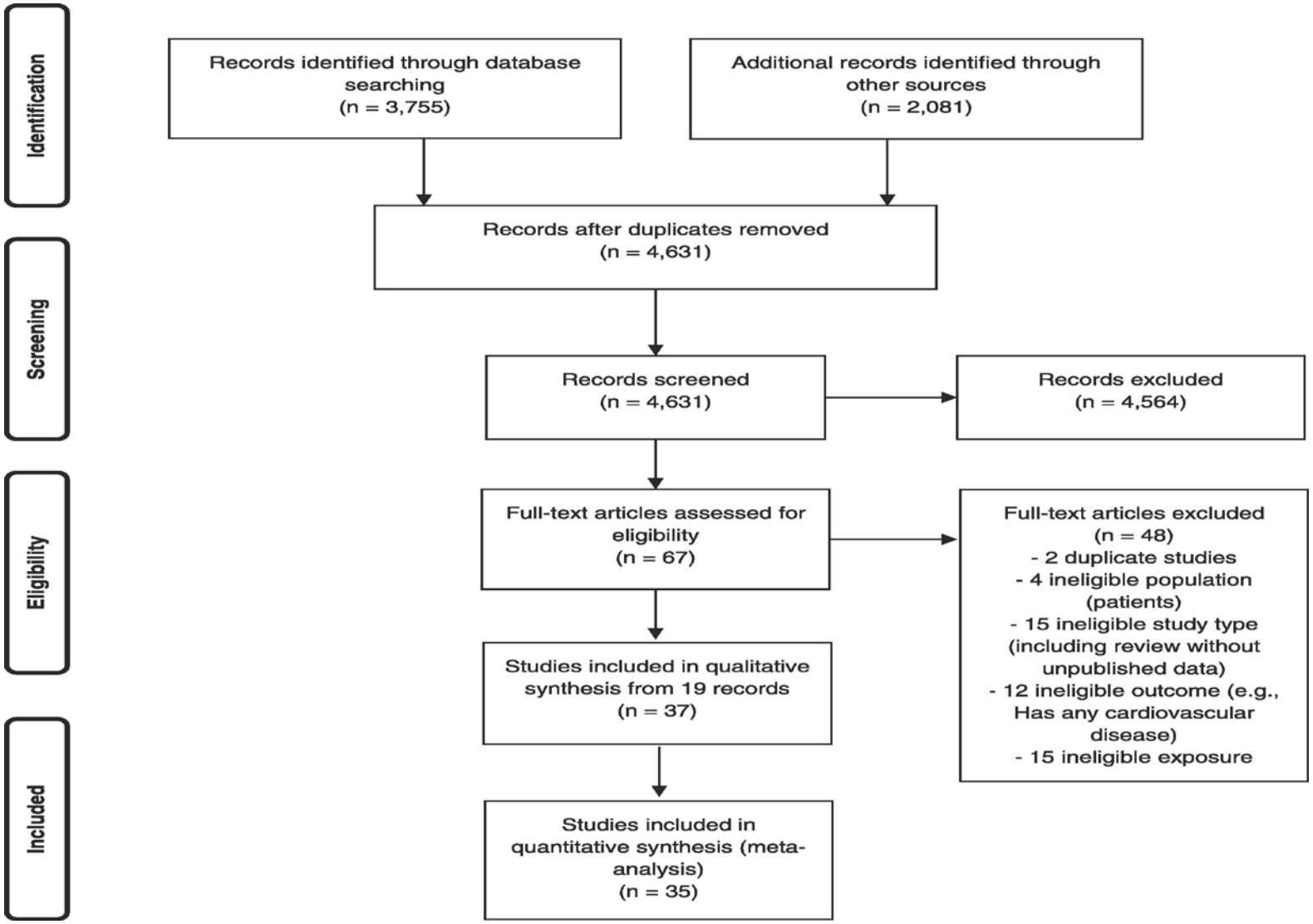
WHO/ILO work-related burden of disease and injury: Protocol for systematic reviews of exposure to long working hours and of the effect of exposure to long working hours on alcohol consumption and alcohol use disorders

Lode Godderis [a, b, 1] ✉, Emma Boonen [b] ✉, Ana L. Cabrera Martimbianco [c], Ellen Delvaux [b] ✉, Ivan D. Ivanov [d] ✉, Marie-Claire Lambrechts [e, f] ✉, Carolina O.C. Latorraca [c], Nancy Leppink [g] ✉, Frank Pega [d] ✉, Annette M. Prüss-Ustün [d] ✉, Rachel Riera [c], Yuka Ujita [g] ✉, Daniela V. Pachito [c] [1] ✉

Logic model of the possible causal relationship between exposure to long working hours and IHD and stroke



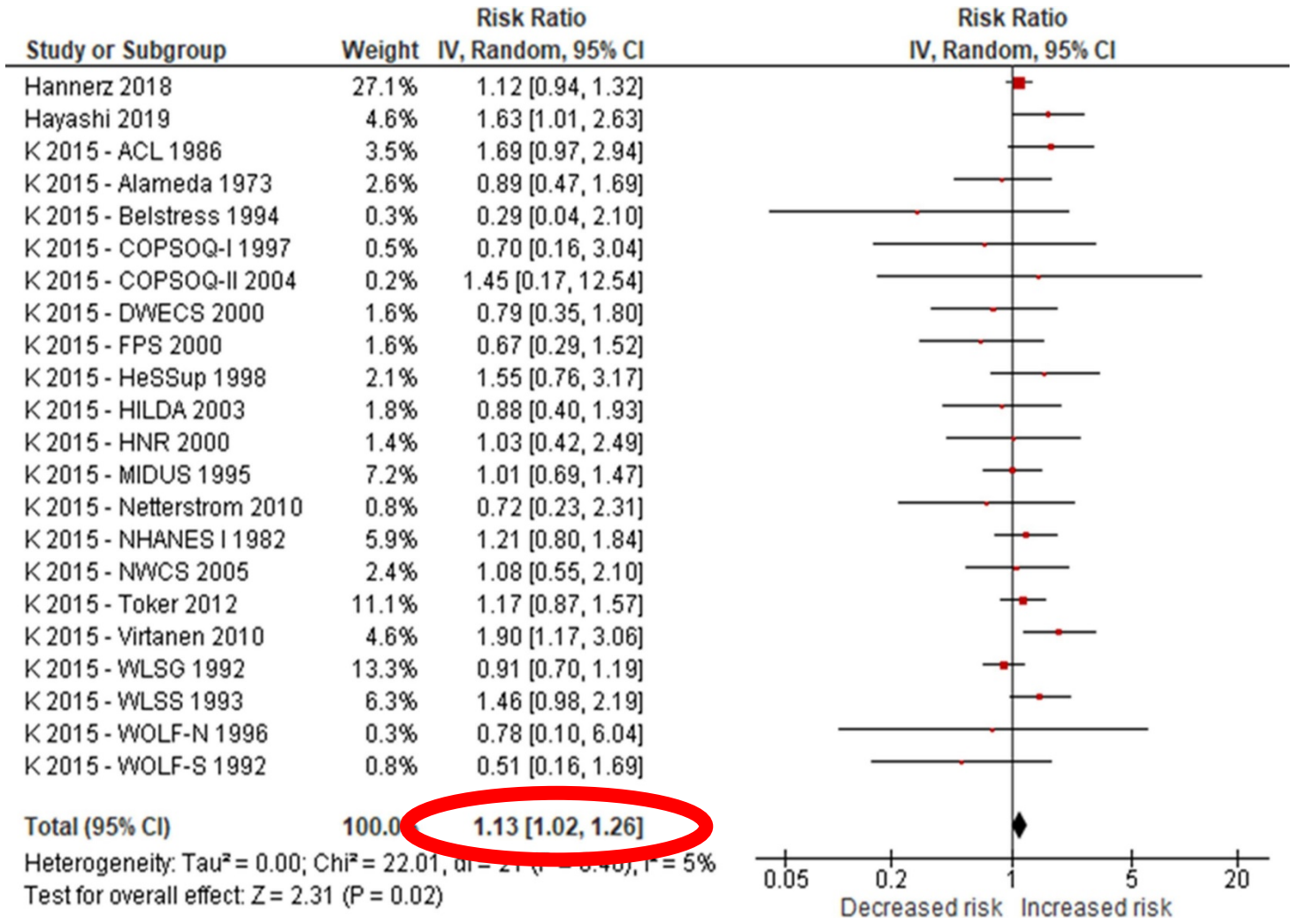
Flow diagram of study selection



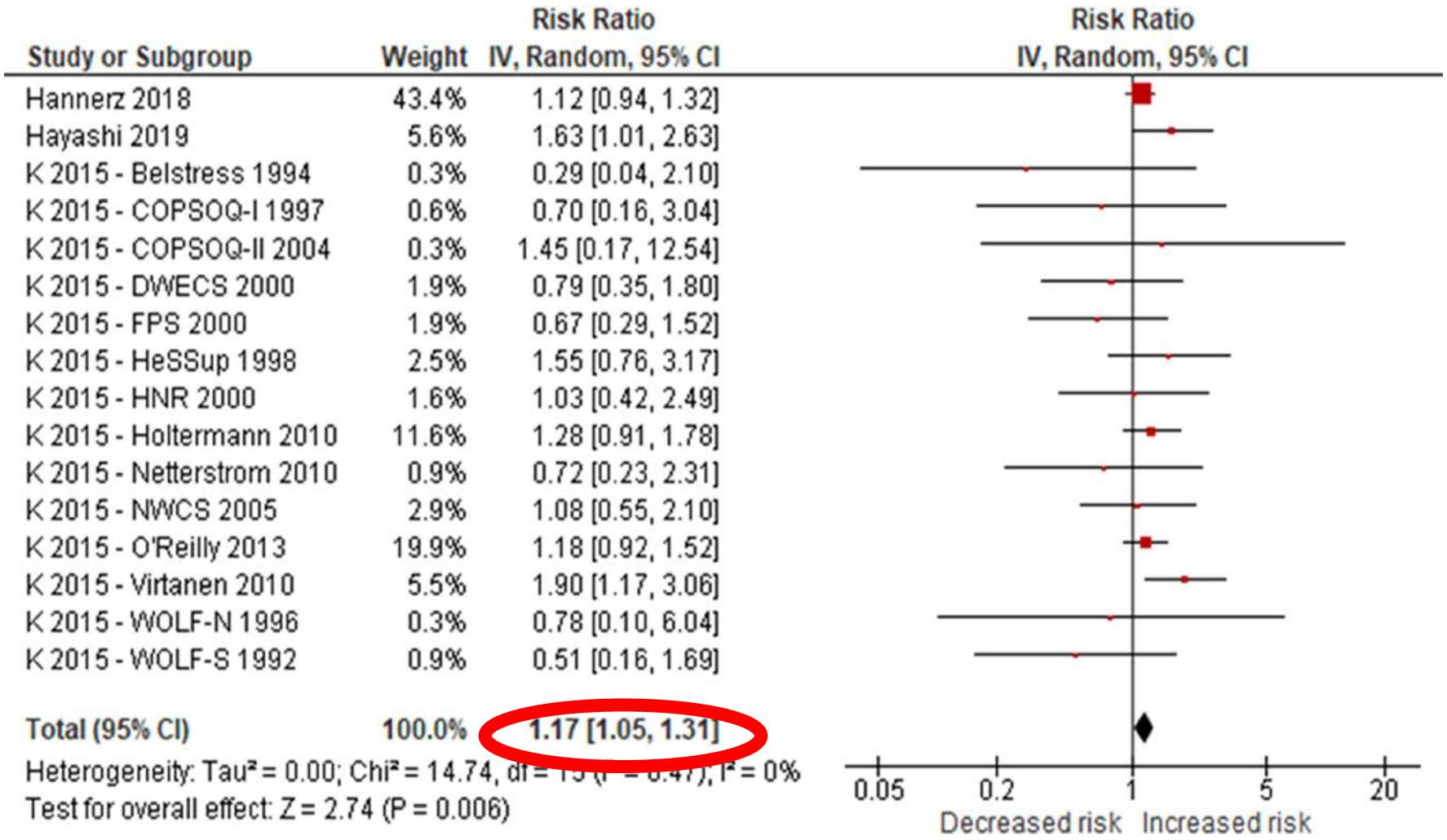
Assessment of risk of bias (by Navigation Guide)

	Kivimaki 2015 - FPS 2000	Kivimaki 2015 - HNR 2000	Kivimaki 2015 - DWECS 2000	Kivimaki 2015 - COPSOQ-II 2004	Kivimaki 2015 - IPAW 1996	Kivimaki 2015 - PUMA 1999	Kivimaki 2015 - NWCS 2005	Hannerz 2018	Hayashi 2019
1. Are the study groups at risk of not representing their source populations in a manner that might introduce selection bias?	Probably high	Probably low	Probably low	Probably high	Probably high	Probably low	Probably low	Probably low	Probably high
2. Was knowledge of the group assignments inadequately prevented (i.e. blinded or masked) during the study, potentially leading to subjective measurement of either exposure or outcome?	Probably low	Probably low	Probably low	Probably low	Probably low	Probably low	Probably low	Probably low	Probably low
3. Were exposure assessment methods lacking accuracy?	Probably low	Probably low	Probably low	Probably low	Probably low	Probably low	Probably low	Probably low	Probably low
4. Were outcome assessment methods lacking accuracy?	Low	Low	Low	Low	Low	Low	Low	Low	Low
5. Was potential confounding inadequately incorporated?	Probably low	Probably low	Probably low	Probably low	Probably low	Probably low	Probably low	Probably low	Probably low
6. Were incomplete outcome data inadequately addressed?	Low	Low	Low	Low	Low	Low	Low	Low	Low
7. Does the study report appear to have selective outcome reporting?	Low	Low	Low	Low	Low	Low	Low	Low	Low
8. Did the study receive any support from a company, study author, or other entity having a financial interest in any of the exposures studied?	Low	Low	Low	Low	Low	Low	Low	Low	Low
9. Did the study appear to have other problems that could put it at a risk of bias?	Low	Low	Low	Low	Low	Low	Low	Low	Low

Long working hours and acquired IHD (≥55 h/week)



Long working hours and died from IHD (≥55 h/week)



Assessment of quality of evidence and strength of evidence (by Navigation Guide and adapted GRADE tools and approaches)

Effect of exposure to long working hours on ischemic heart disease among workers

Population: all ≥15 years workers
Settings: all countries and work settings
Exposure: worked 41–48, 49–54 or ≥55 h/week
Comparator: worked 35–40 h/week

Outcomes	Exposure category	Illustrative comparative risks (95% CI)		Relative effect (95% CI)	No. of participants (studies)	Quality of the evidence	Strength of evidence for human evidence	Comments
		Assumed risk	Corresponding risk					
		Unexposed workers (worked 35–40 h/week)	Workers in the exposure category					
Has ischaemic heart disease	–	–	–	–	–	–	–	No evidence was found on this outcome.
Acquired ischaemic heart disease (measured with administrative record or self-report) Follow-up: 1–20 years	**Worked 41–48 h/week**	**150 cases per 100,000 person years** [a]	**147 per 100,000 person years** (137 to161)	**RR 0.98** (0.91 to 1.07)	312,209 (20 studies)	⊕⊖⊖ Low[b]	Inadequate evidence of toxicity/ harmfulness	Better indicated by lower values Additional evidence from nine case-control studies also provided no evidence for an effect for this comparison on this outcome. We are very uncertain about the effect of this exposure category on this outcome.
	Worked 49–54 h/week		**158 per 100,000 person years** (141 to 176)	**RR 1.05** (0.94 to 1.17)	308,405 (18 studies)	⊕⊖⊖ Low[b]	Inadequate evidence of toxicity/ harmfulness	Better indicated by lower values Additional evidence from eight case-control studies also provided no evidence for an effect for this comparison on this outcome. We are very uncertain about the effect of this exposure category on this outcome.
	Worked ≥55 h/week		**170 per 100,000 person years** (153 to 189)	**RR 1.13** (1.02 to 1.26)	339,680 (22 studies)	⊕⊕⊖ Moderate	Sufficient evidence of toxicity/harmfulness	Better indicated by lower values Additional evidence from 11 case-control studies also suggests a small increase in the risk for the outcome for this comparison. Compared with working 35–40 h/week, working ≥55 h/week may have led to an increase in having acquired ischemic heart disease.
Died from ischemic heart disease (mortality) (measured with administrative record) Follow-up: 8–30 years	**41–48 h/w**	**150 cases per 100,000 person years**[a]	**149 per 100,000 person years** (132 to168)	**RR 0.99** (0.88 to 1.12)	288,278 (13 studies)	⊕⊖⊖ Low[b,c]	Inadequate evidence of toxicity/ harmfulness	Better indicated by lower values We are very uncertain about the effect of this exposure category on this outcome
	49–54 h/w		**152 per 100,000 person years** (123 to 188)	**RR 1.01** (0.82 to 1.25)	284,474 (11 studies)	⊕⊖⊖ Low[b,c]	Inadequate evidence of toxicity/	Better indicated by lower values. We are very uncertain about the effect of this exposure category on this outcome
	≥55 h/w		**176 per 10,000 person years** (158 to 196)	**RR 1.17** (1.05 to 1.31)	726,803 (16 studies)	⊕⊕⊖ Moderate	Sufficient evidence of toxicity/harmfulness	Better indicated by lower values Compared with working 35–40 h/week, working ≥55 h/week may have led to an increase in dying due to ischemic heart disease.

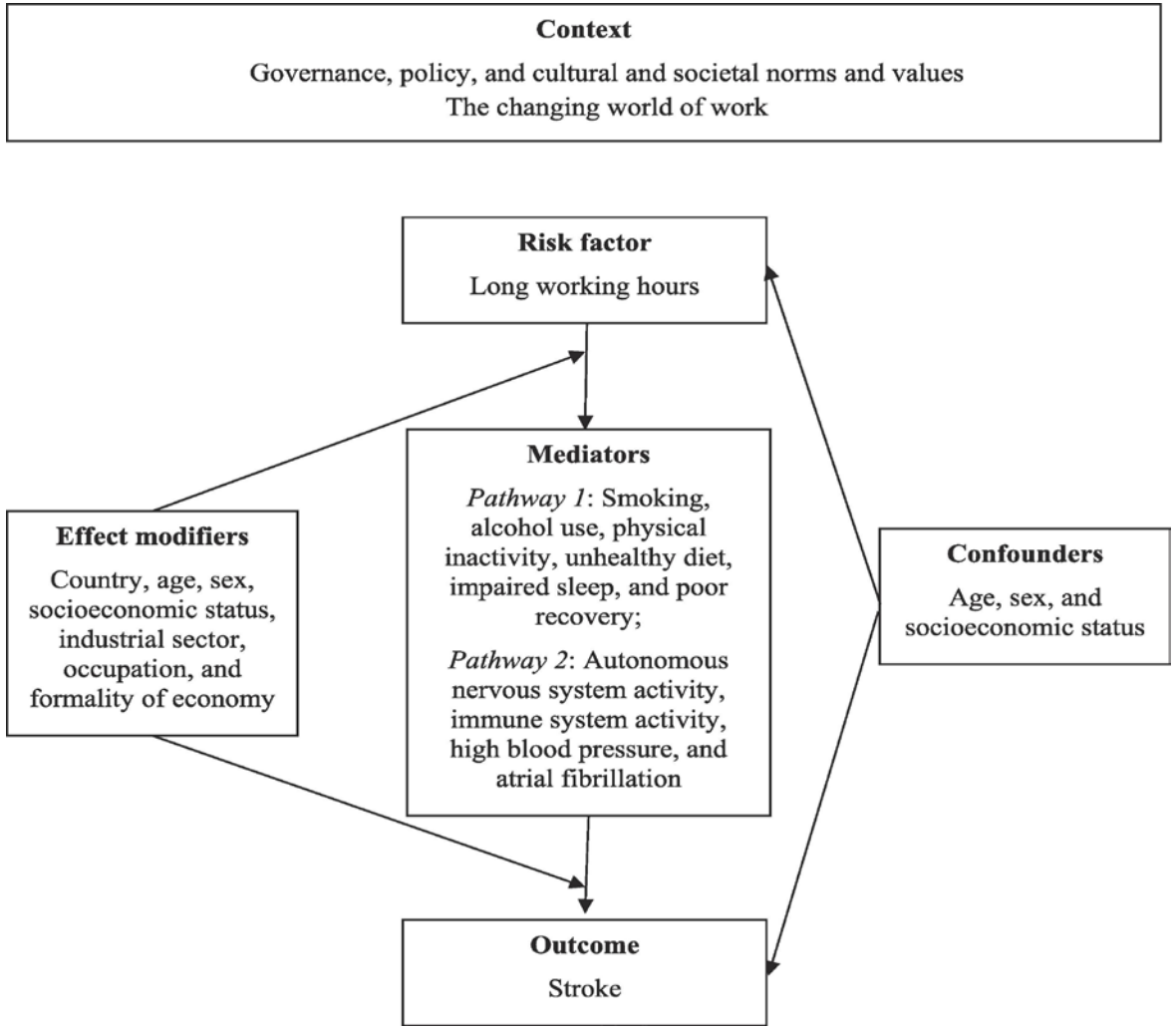
CI: confidence interval; **RR**: relative risk.
Navigation Guide quality of evidence ratings
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

≥55 h/week:

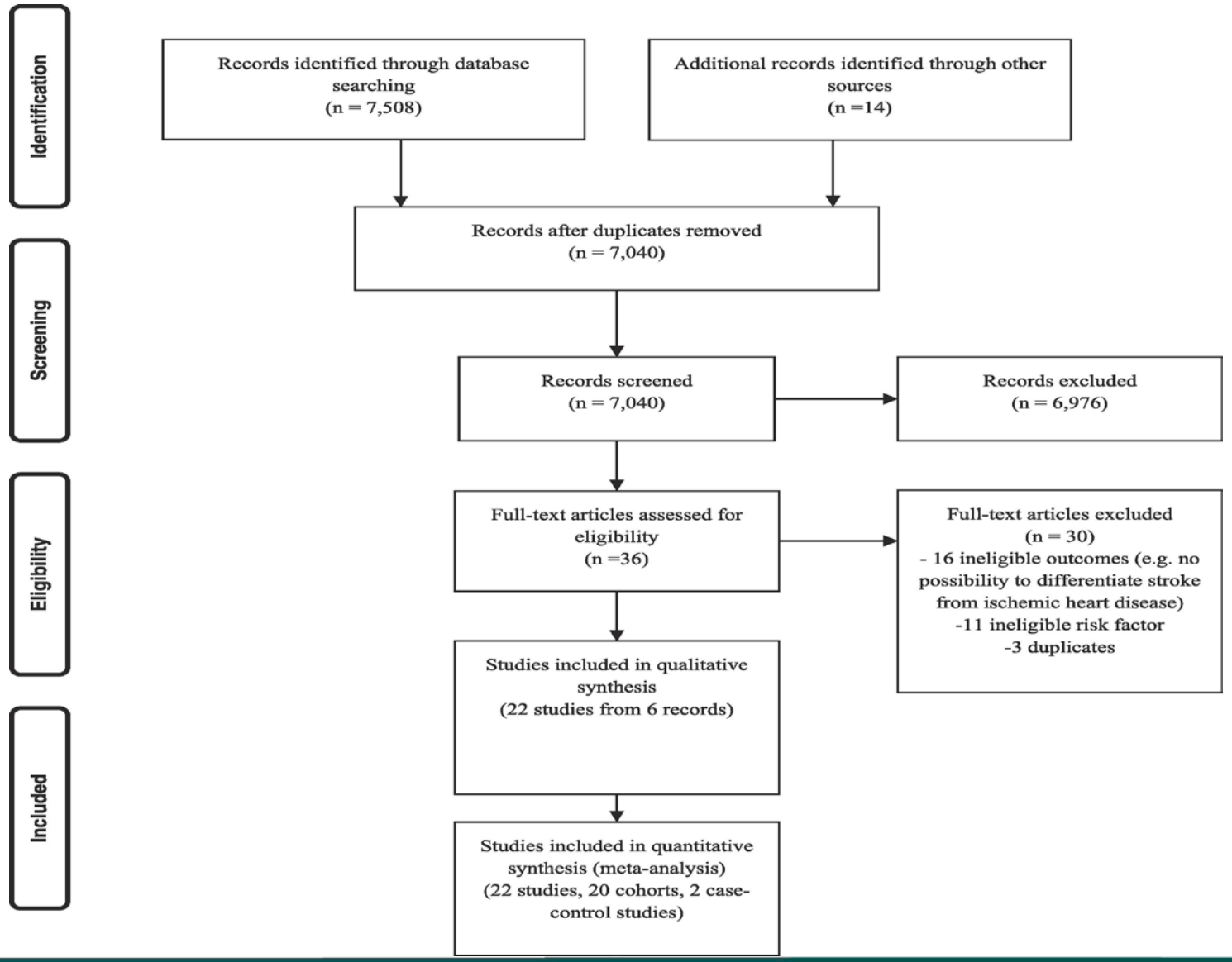
Quality of evidence: Moderate

Strength of evidence for human evidence: Sufficient evidence of toxicity / harmfulness

Logic model of the possible causal relationship between exposure to long working hours and stroke



Flow diagram of study selection

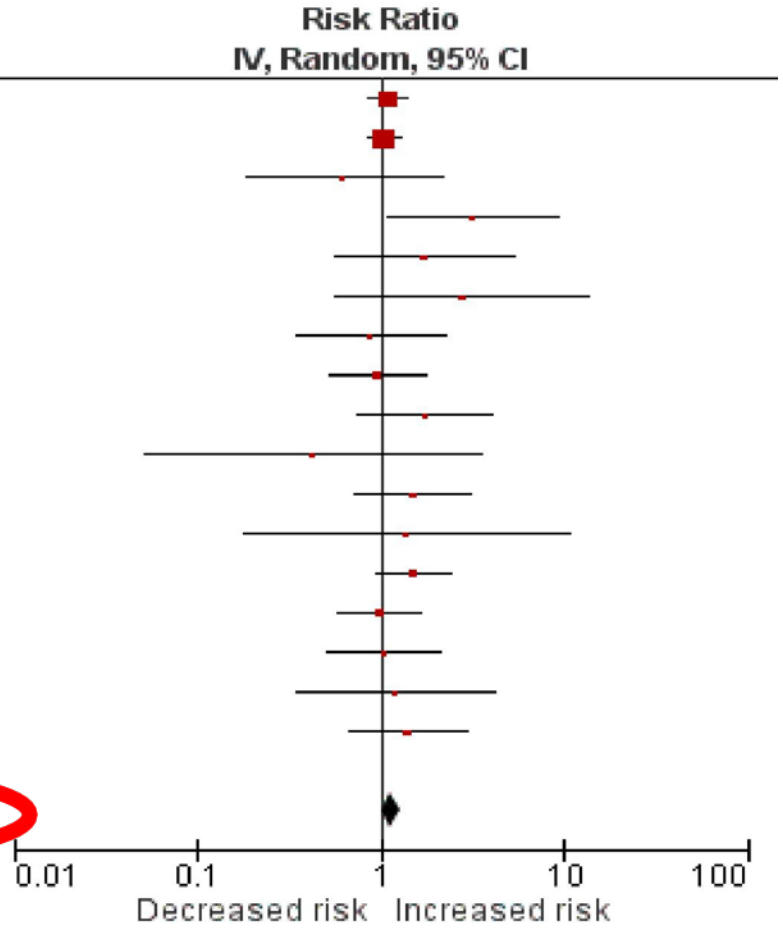


Long working hours and risk of acquired stroke (49–54 h/week)

Study or Subgroup	log[Risk Ratio]	SE	Weight	Risk Ratio IV, Random, 95% CI
Hannerz 2018	0.0953	0.1194	27.4%	1.10 [0.87, 1.39]
Hayashi 2019	0.0488	0.1011	38.2%	1.05 [0.86, 1.28]
Kivimaki 2015 - ACL 1986	-0.462	0.6263	1.0%	0.63 [0.18, 2.15]
Kivimaki 2015 - Alameda 1973	1.1569	0.5514	1.3%	3.18 [1.08, 9.37]
Kivimaki 2015 - COPSOQ-1 1997	0.5481	0.5712	1.2%	1.73 [0.56, 5.30]
Kivimaki 2015 - COPSOQ-II 2004	1.0296	0.8116	0.6%	2.80 [0.57, 13.74]
Kivimaki 2015 - DWECS 2000	-0.1278	0.4744	1.7%	0.88 [0.35, 2.23]
Kivimaki 2015 - FPS 2000	-0.0408	0.3121	4.0%	0.96 [0.52, 1.77]
Kivimaki 2015 - HeSSup 1998	0.5653	0.4327	2.1%	1.76 [0.75, 4.11]
Kivimaki 2015 - MIDUS 1995	-0.844	1.0842	0.3%	0.43 [0.05, 3.60]
Kivimaki 2015 - NHANES I 1982	0.3988	0.3655	2.9%	1.49 [0.73, 3.05]
Kivimaki 2015 - PUMA 1999	0.3293	1.0456	0.4%	1.39 [0.18, 10.79]
Kivimaki 2015 - Whiteall II 1991	0.4187	0.2394	6.8%	1.52 [0.95, 2.43]
Kivimaki 2015 - WLSG 1992	-0.0202	0.272	5.3%	0.98 [0.58, 1.67]
Kivimaki 2015 - WLSS 1992	0.0488	0.3633	3.0%	1.05 [0.52, 2.14]
Kivimaki 2015 - Wolf-N 1996	0.1906	0.6288	1.0%	1.21 [0.35, 4.15]
Kivimaki 2015 - Wolf-S 1992	0.3436	0.3749	2.8%	1.41 [0.68, 2.94]
Total (95% CI)			**100.0%**	**1.13 [1.00, 1.28]**

Heterogeneity: Tau² = 0.00; Chi² = 11.99, df = 16 (P = 0.74); I² = 0%

Test for overall effect: Z = 2.02 (P = 0.04)

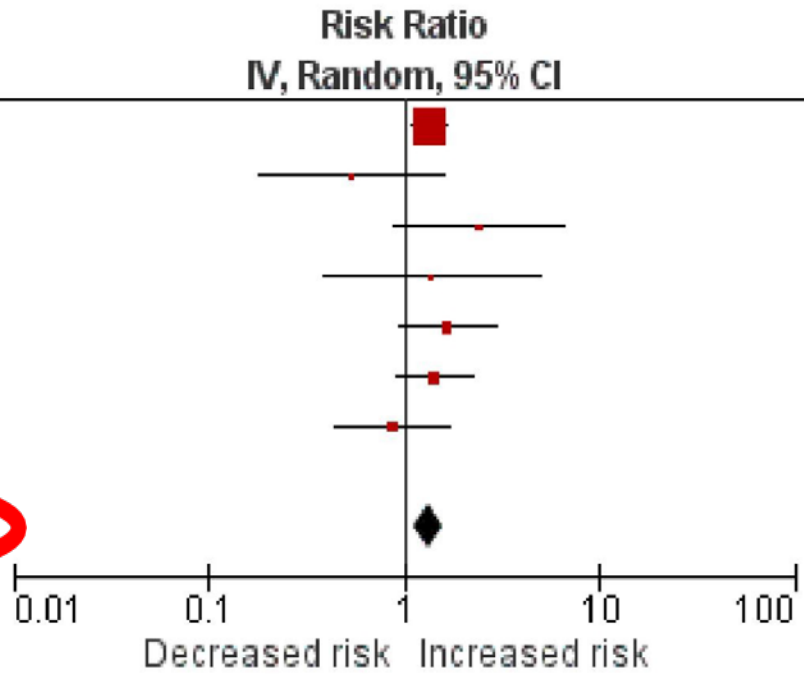


Long working hours and risk of acquired stroke (≥55 h/week)

Study or Subgroup	log[Risk Ratio]	SE	Weight	Risk Ratio IV, Random, 95% CI
Fadel 2019	0.3075	0.1048	60.8%	1.36 [1.11, 1.67]
Kivimaki 2015 - ACL 1986	-0.6162	0.5542	2.7%	0.54 [0.18, 1.60]
Kivimaki 2015 - Alameda 1973	0.8838	0.5173	3.1%	2.42 [0.88, 6.67]
Kivimaki 2015 - MIDUS 1995	0.3293	0.649	2.0%	1.39 [0.39, 4.96]
Kivimaki 2015 - NHANES I 1982	0.5188	0.2924	9.5%	1.68 [0.95, 2.98]
Kivimaki 2015 - WLSG 1992	0.3646	0.2322	14.8%	1.44 [0.91, 2.27]
Kivimaki 2015 - WLSS 1992	-0.1278	0.3419	7.0%	0.88 [0.45, 1.72]
Total (95% CI)			**100.0%**	**1.35 [1.13, 1.61]**

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 6.22$, df = 6 (P = 0.40); $I^2 = 3\%$

Test for overall effect: Z = 3.26 (P = 0.001)



Assessment of quality of evidence and strength of evidence (by Navigation Guide and adapted GRADE tools and approaches)

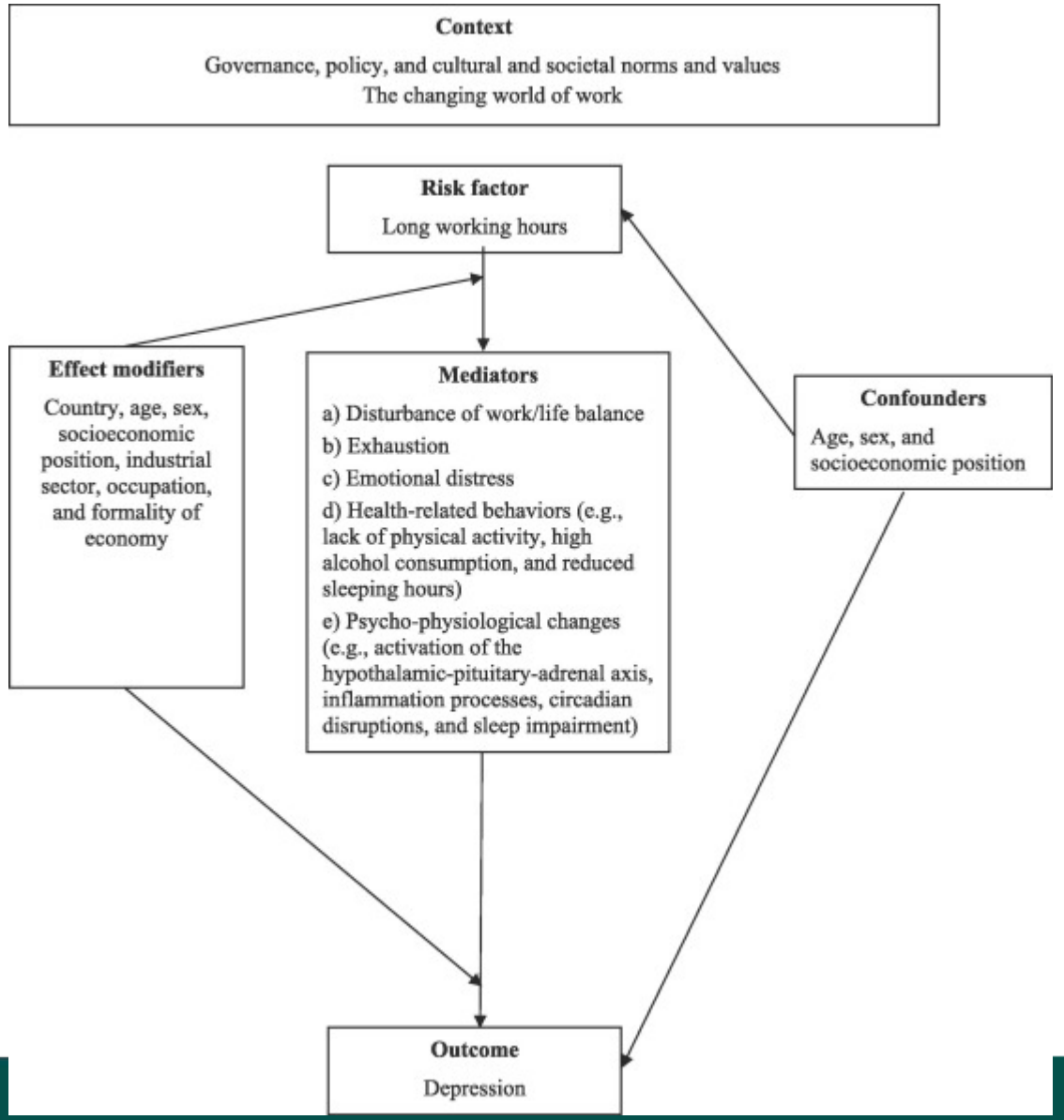
Effect of exposure to long working hours on stroke among workers
Population: all ≥15 years workers
Settings: all countries and work settings
Exposure: worked 41–48, 49–54 or ≥55 h/week (or equivalent)
Comparator: worked 35–40 h/ week

Outcomes	Exposure category	Illustrative comparative risks (95% CI)		Relative effect (95% CI)	No. of participants (studies)	Quality of the evidence	Strength of Evidence for Human Evidence	Comments
		Assumed risk Unexposed workers (worked 35–40 h/ week)	Corresponding risk Workers in the exposure category					
Has stroke	–	–	–	–	–	–		No evidence was found on this outcome.
Acquired Stroke (measured with administrative record or self-report) Follow-up: 8–20 years	**Worked 41–48 h/week**	**150 cases per 100,000 person years** [a]	**165 per 100,000 person years** (141–192)	**RR 1.04** (0.94–1.14)	277,202 (18 studies)	⊖ Low [b]	Inadequate evidence of harmfulness	Better indicated by lower values Additional evidence from one additional cohort study and a case-control study also provided no evidence for an effect for this comparison on this outcome. We are very uncertain about the effect of this exposure category on this outcome.
	Worked 49–54 h/week		**191 per 100,000 person years** (155–235)	**RR 1.13** (1.00–1.28), P = 0.04	275,139 (17 studies)	⊕⊖ Moderate [c]	Limited evidence of harmfulness	Better indicated by lower values Additional evidence from one additional cohort study and a case-control study also provided a small but possible evidence for an effect for this comparison on this outcome. We are very uncertain about the effect of this exposure category on this outcome.
	Worked ≥ 55 h/week		**203 per 100,000 person years** (179 to 242)	**RR 1.35**	162,644 (7 studies)	⊕⊖ Moderate [c]	Sufficient evidence of toxicity/ harmfulness	Better indicated by lower values Additional evidence from two case-control studies also suggests a small increase in the risk for the outcome for this comparison. Compared with working 35–40 h/ week, working ≥ 55 h/week may have led to an increase in having acquired stroke.
Died from stroke (mortality) (measured with administrative record) Follow-up: 8–20 years	**41–48 h/w**	**150 cases per 100,000 person years** [a]	**152 per 100,000 person years** (137–168)	**RR 1.01** (0.91–1.12)	265,937 (12 studies)	⊖ Low [b]	Inadequate evidence of toxicity/ harmfulness	Better indicated by lower values We are very uncertain about the effect of this exposure category on this outcome
	49–54 h/w		**170 per 100,000 person years** (149–194)	**RR 1.13** (0.99–1.29)	256,129 (11 studies)	⊖ Low [b]	Inadequate evidence of toxicity/ harmfulness	Better indicated by lower values. We are very uncertain about the effect of this exposure category on this outcome
	≥55 h/w		**167 per 10,000 person years** (157–205)	**RR 1.08** (0.89–1.31)	726,803 (10 studies)	⊖ Low [b]	Inadequate evidence of toxicity/ harmfulness	Better indicated by lower values Compared with working 35–40 h/week, working ≥ 55 h/week may have led to an increase in dying due to stroke but

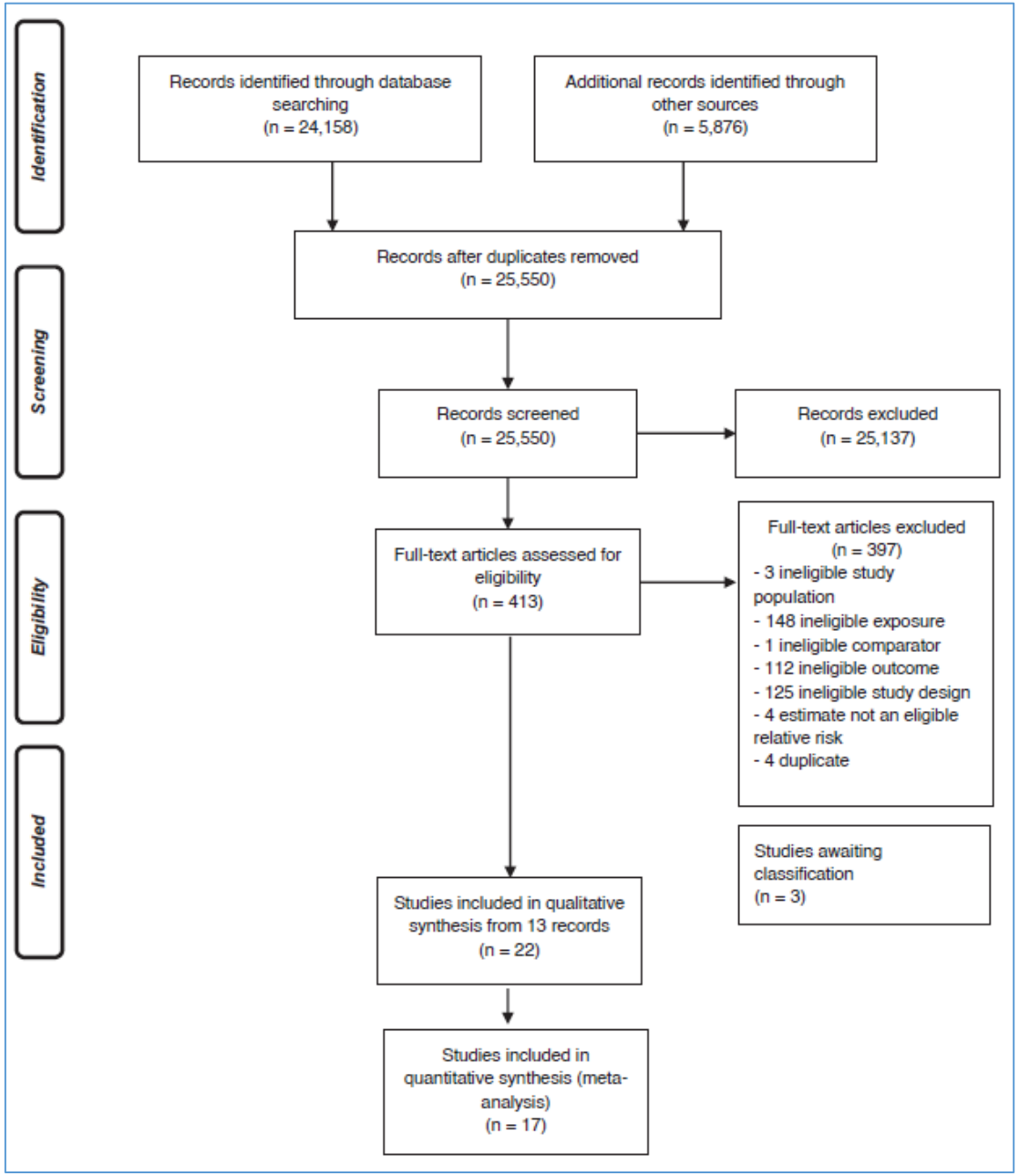
CI: confidence interval; **RR**: relative risk.
Navigation Guide quality of evidence ratings
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

[a] We extracted the risk of any stroke events among workers working 35–40 h/week from Hannerz 2018 as the assumed risk. (Note that this study provided one baseline risk for both non-fatal and/or fatal stroke, so that it was not possible to differentiate assumed risk for exclusively non-fatal events and fatal events separately.)
[b] Downgraded by one grade, because of serious imprecision (i.e., large CIs in the pooled effect estimate).
[c] Downgraded by one grade, because of serious imprecision (i.e., large CIs in the pooled effect estimate), and upgraded for a dose-response relationship.

Logic model of the possible causal relationship between exposure to long working hours and depression



Flow diagram of study selection



Results, meta-analyses

41 to 48 hours/week versus 35 to 40 hours/week

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Random, 95% CI
Ahn 2018	0.0296	0.0863	26.3%	1.03 [0.87, 1.22]
Kim 2013	0.213	0.1139	23.2%	1.24 [0.99, 1.55]
NLSY OA Cohort, 2019	0.1875	0.1535	18.9%	1.21 [0.89, 1.63]
Shields 1999, Men	-0.5108	0.3741	6.3%	0.60 [0.29, 1.25]
Shields 1999, Women	0.7885	0.3536	6.8%	2.20 [1.10, 4.40]
Virtanen 2012	-0.3857	0.4005	5.6%	0.68 [0.31, 1.49]
Wang 2012a	-0.6934	0.4961	3.9%	0.50 [0.19, 1.32]
Wang 2012b	0.2447	0.4756	4.2%	1.28 [0.50, 3.24]
Zadow 2019	-0.557	0.434	4.9%	0.57 [0.24, 1.34]
Total (95% CI)			**100.0%**	**1.05 [0.86, 1.29]**

Heterogeneity: Tau² = 0.03; Chi² = 14.76, df = 8 (P = 0.06); I² = 46%
Test for overall effect: Z = 0.47 (P = 0.64)

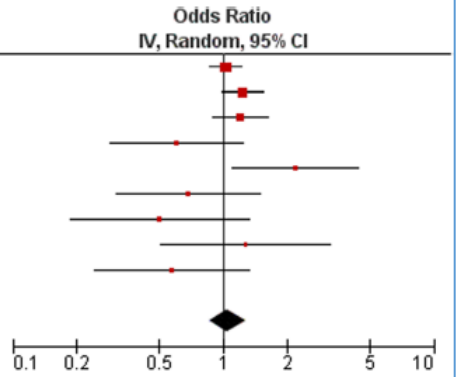


Fig. 4. Main meta-analysis, Acquired depression, worked 41–48 h/week compared with worked 35–40 h/week.

49 to 54 hours/week versus 35 to 40 hours/week

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Fixed, 95% CI
Ahn 2018	-0.0834	0.1012	43.6%	0.92 [0.75, 1.12]
Kim 2013	0.1392	0.1287	27.0%	1.15 [0.89, 1.48]
NLSY OA Cohort, 2019	0.161	0.183	13.3%	1.17 [0.82, 1.68]
Shields 1999, Men	-0.5108	0.3741	3.2%	0.60 [0.29, 1.25]
Shields 1999, Women	0.7885	0.3536	3.6%	2.20 [1.10, 4.40]
Virtanen 2012	0.207	0.3764	3.2%	1.23 [0.59, 2.57]
Wang 2012a	0.3205	0.4453	2.3%	1.38 [0.58, 3.30]
Wang 2012b	0.8061	0.4309	2.4%	2.24 [0.96, 5.21]
Zadow 2019	-0.347	0.556	1.4%	0.71 [0.24, 2.10]
Total (95% CI)			**100.0%**	**1.06 [0.93, 1.21]**

Heterogeneity: Chi² = 13.29, df = 8 (P = 0.10); I² = 40%
Test for overall effect: Z = 0.94 (P = 0.35)

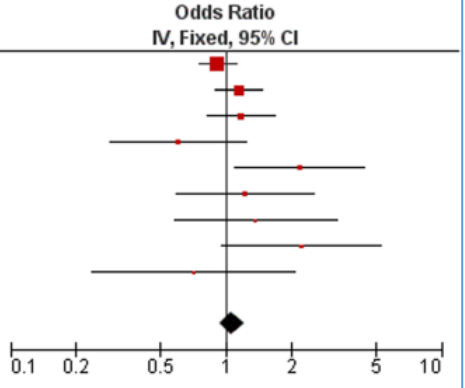


Fig. 5. Main meta-analysis, Acquired depression, worked 49–54 h/week compared with worked 35–40 h/week.

≥55 hours/week versus 35 to 40 hours/week

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Random, 95% CI
Ahn 2018	0.3365	0.0908	12.4%	1.40 [1.17, 1.67]
Kim 2013	0.1784	0.1218	10.7%	1.20 [0.94, 1.52]
NLSY OA Cohort, 2019	0.1284	0.1614	8.6%	1.14 [0.83, 1.56]
Shields 1999, Men	-0.5108	0.3741	2.9%	0.60 [0.29, 1.25]
Shields 1999, Women	0.7885	0.3536	3.2%	2.20 [1.10, 4.40]
Virtanen 2012	0.8879	0.3988	2.6%	2.43 [1.11, 5.31]
Virtanen 2018, ACL	-0.755	0.444	2.2%	0.47 [0.20, 1.12]
Virtanen 2018, DWECS2000	-0.1625	0.3851	2.8%	0.85 [0.40, 1.81]
Virtanen 2018, ELSA	-0.4463	0.3079	3.9%	0.64 [0.35, 1.17]
Virtanen 2018, HESSUP	0.0677	0.1278	10.4%	1.07 [0.83, 1.37]
Virtanen 2018, HILDA	-0.0513	0.1558	8.9%	0.95 [0.70, 1.29]
Virtanen 2018, HRS	0.1222	0.1227	10.6%	1.13 [0.89, 1.44]
Virtanen 2018, PUMA	1.5539	1.1664	0.4%	4.73 [0.48, 46.53]
Virtanen 2018, SHARE	-0.1278	0.1871	7.5%	0.88 [0.61, 1.27]
Virtanen 2018, SLOSH	0.1823	0.1828	7.7%	1.20 [0.84, 1.72]
Wang 2012a	-0.1218	0.4552	2.1%	0.89 [0.36, 2.16]
Wang 2012b	0.0685	0.6135	1.2%	1.07 [0.32, 3.56]
Zadow 2019	-0.632	0.481	1.9%	0.53 [0.21, 1.36]
Total (95% CI)			**100.0%**	**1.08 [0.94, 1.24]**

Heterogeneity: Tau² = 0.03; Chi² = 31.29, df = 17 (P = 0.02); I² = 46%
Test for overall effect: Z = 1.11 (P = 0.27)

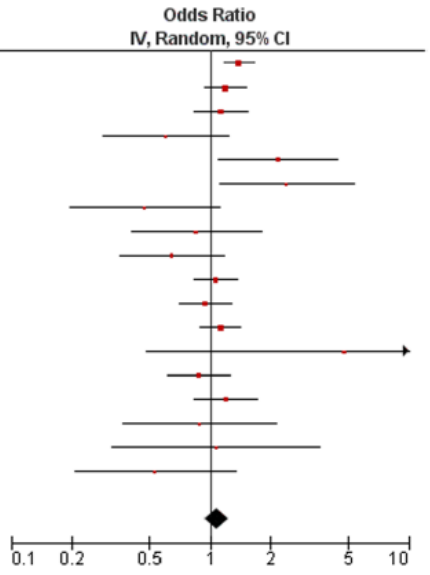
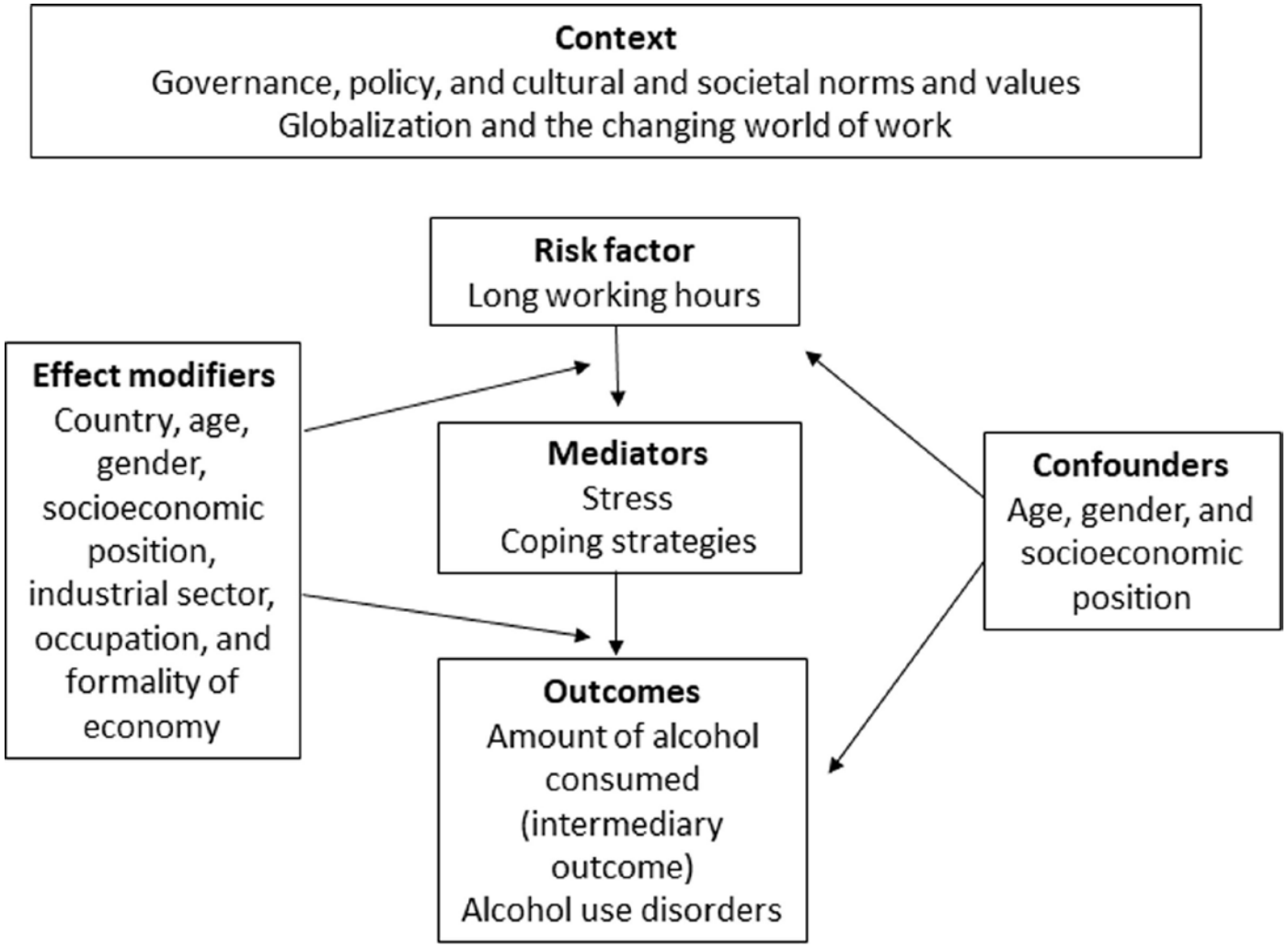
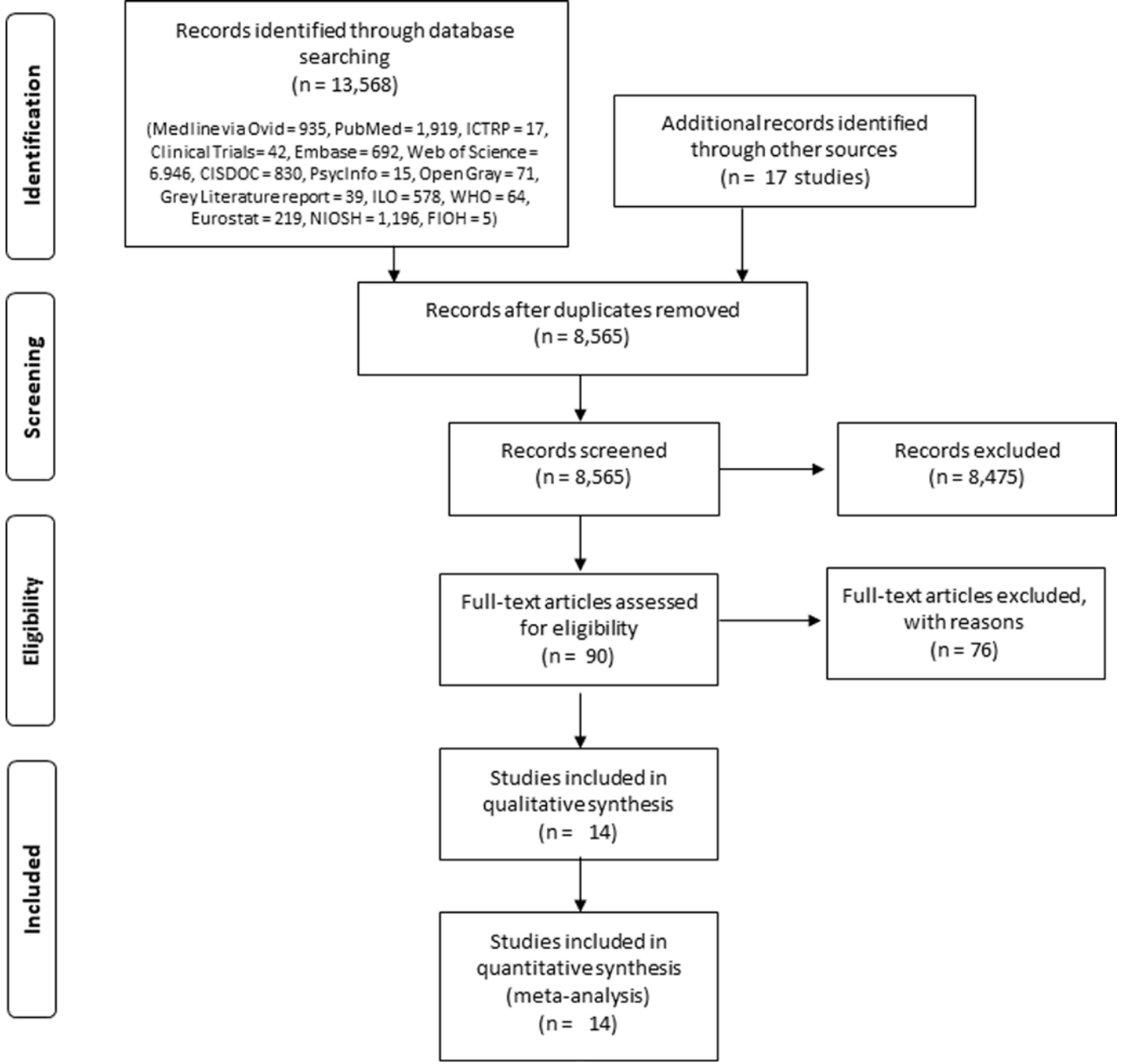


Fig. 6. Main meta-analysis, Acquired depression, worked ≥ 55 h/week compared with worked 35–40 h/week.

Logic model of causal relationship between LWH and alc. consumption, risky alc. use and alc. use disorder



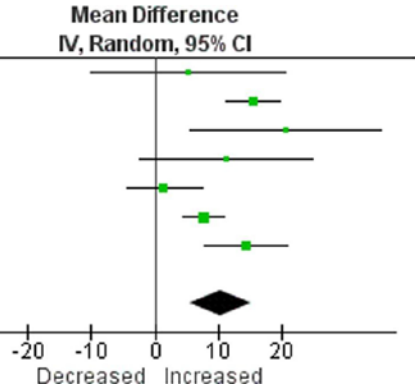
Flow diagram



Long working hours and alcohol in g/week

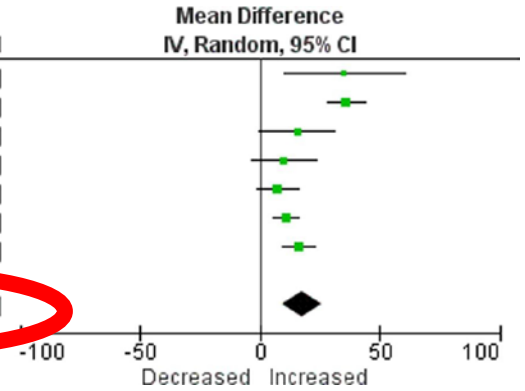
Study or Subgroup	Worked 41-48 hours/week Mean	SD	Total	Worked 35-40 hours/week Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
BELSTRESS	156.77	134.89	408	151.51	152.96	1467	7.1%	5.26 [-9.99, 20.51]
HeSSup	76.49	92.5	4423	60.98	86.2	2894	20.7%	15.51 [11.35, 19.67]
HILDA	107.4	138.32	470	86.76	125.08	838	7.2%	20.64 [5.54, 35.74]
NHANES	63.72	106.4	360	52.38	165.66	1605	8.2%	11.34 [-2.32, 25.00]
NLSY	34.35	67.16	694	32.9	78.39	2221	17.8%	1.45 [-4.52, 7.42]
SOEP	50.95	74.77	3258	43.25	67.98	4665	22.1%	7.70 [4.48, 10.92]
WLS	62.32	80.21	781	47.89	72.43	1820	16.9%	14.43 [7.89, 20.97]
Total (95% CI)			**10394**			**15510**	**100.0%**	**10.40 [5.59, 15.20]**

Heterogeneity: Tau² = 24.51; Chi² = 20.67, df = 6 (P = 0.002); I² = 71%
Test for overall effect: Z = 4.24 (P < 0.0001)



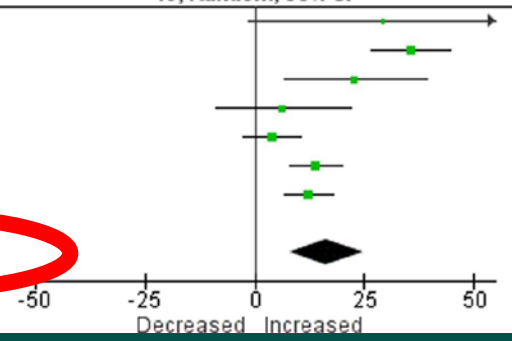
Study or Subgroup	Worked 49-54 hours/week Mean	SD	Total	Worked 35-40 hours/week Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
BELSTRESS	186.92	149.79	154	151.51	152.96	1467	7.3%	35.41 [10.49, 60.33]
HeSSup	96.9	103.18	745	60.98	86.2	2894	16.6%	35.92 [27.87, 43.97]
HILDA	102.43	119.04	306	86.76	125.08	838	11.7%	15.67 [-0.13, 31.47]
NHANES	62.34	91.99	268	52.38	165.66	1605	13.0%	9.96 [-3.71, 23.63]
NLSY	40.35	87.04	431	32.9	78.39	2221	16.1%	7.45 [-1.39, 16.29]
SOEP	54.33	81.22	1028	43.25	67.98	4665	18.1%	11.08 [5.75, 16.41]
WLS	64.2	81.24	716	47.89	72.43	1820	17.3%	16.31 [9.49, 23.13]
Total (95% CI)			**3648**			**15510**	**100.0%**	**17.69 [9.16, 26.22]**

Heterogeneity: Tau² = 97.29; Chi² = 33.45, df = 6 (P < 0.00001); I² = 82%
Test for overall effect: Z = 4.07 (P < 0.0001)

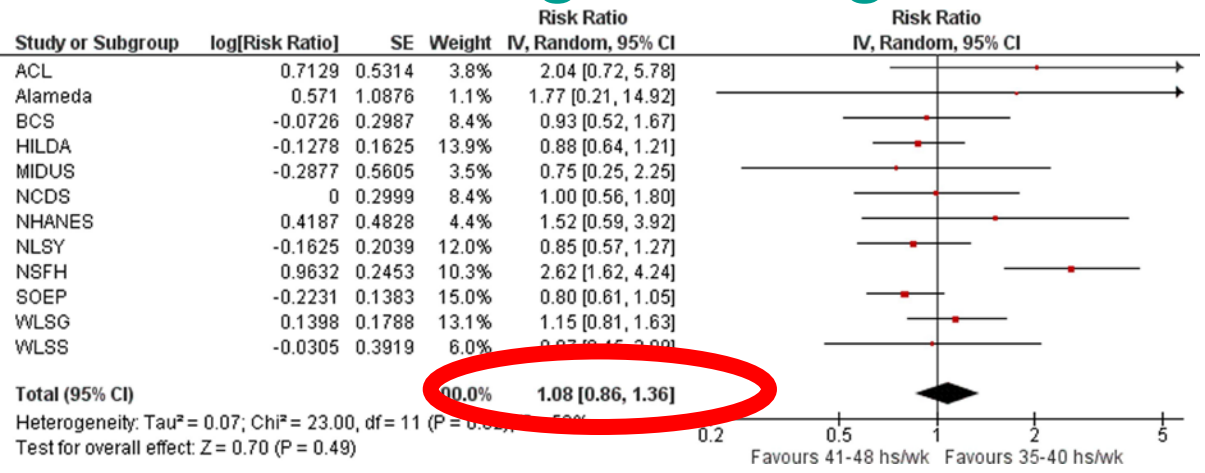


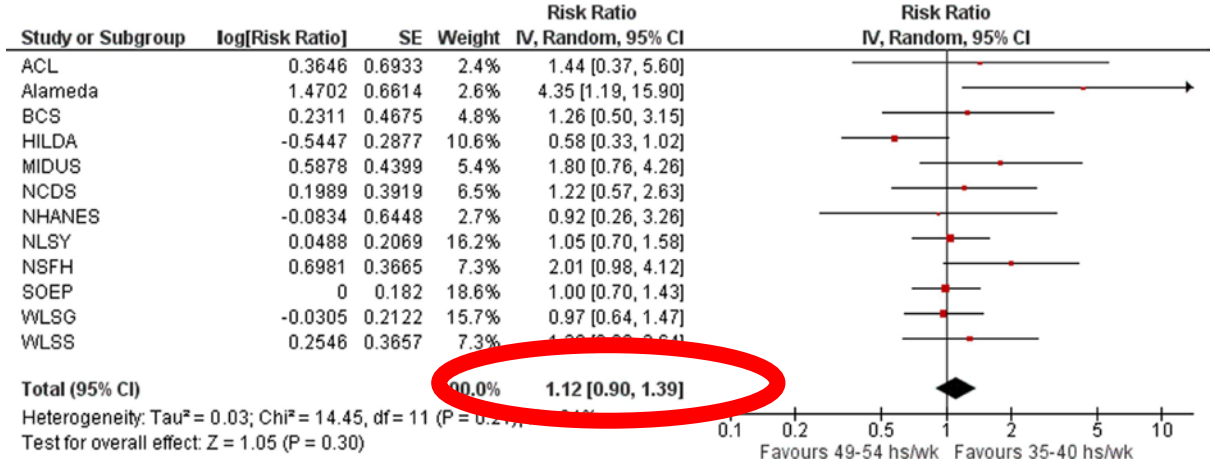
Study or Subgroup	Worked ≥ 55 hours/week Mean	SD	Total	Worked 35-40 hours/week Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
BELSTRESS	180.79	148.93	97	151.51	152.96	1467	5.4%	29.28 [-1.37, 59.93]
HeSSup	96.5	132.26	897	60.98	86.2	2894	16.3%	35.52 [26.31, 44.73]
HILDA	109.61	137.35	380	86.76	125.08	838	11.5%	22.85 [6.65, 39.05]
NHANES	58.8	128.68	370	52.38	165.66	1605	12.0%	6.42 [-8.99, 21.83]
NLSY	36.76	71.36	571	32.9	78.39	2221	17.9%	3.86 [-2.84, 10.56]
SOEP	57.26	86.69	878	43.25	67.98	4665	18.3%	14.01 [7.95, 20.07]
WLS	60.09	71.31	989	47.89	72.43	1820	18.6%	12.20 [6.65, 17.75]
Total (95% CI)			**4182**			**15510**	**100.0%**	**16.29 [7.93, 24.65]**

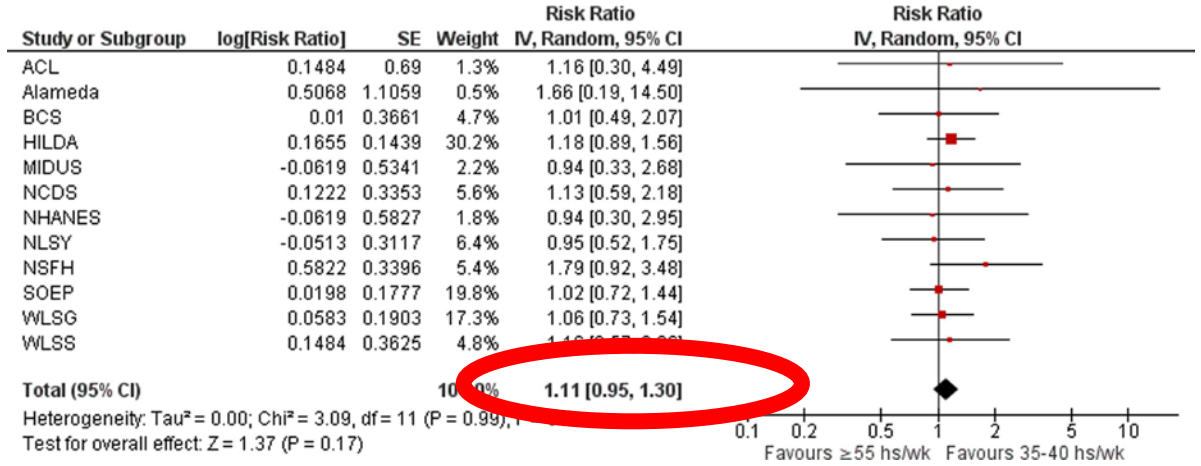
Heterogeneity: Tau² = 89.78; Chi² = 33.21, df = 6 (P < 0.00001); I² = 82%
Test for overall effect: Z = 3.82 (P = 0.0001)



Long working hours and risky drinking







Conclusions

- **IHD:**
  - Evidence **≥55 h/week** was judged as "**sufficient evidence** of harmfulness" for IHD incidence and mortality
- **Stroke:**
  - Evidence **48–54 h/week and ≥55 h/week** was judged as "**limited** evidence for harmfulness" and "**sufficient** evidence for harmfulness" for stroke incidence, respectively.
- **Depression:**
  - "**inadequate evidence** for harmfulness" for all three exposure categories of long working hours
- **Alcohol:**
  - **Evidence** on increased **alcohol consumption** in g/week for all risk levels of exposure, but **not** associated with the risk of **risky drinking**

Publications

Environment International 142 (2020) 105739

Contents lists available at ScienceDirect

Environment International

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The effect of exposure to long working hours on ischaemic heart disease: A systematic review and meta-analysis from the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury

Jian Li[a,*,1], Frank Pega[b], Yuka Ujita[c], Chantal Brisson[d], Els Clays[e], Alexis Descatha[f,g,h], Marco M. Ferrario[i], Lode Godderis[j,k], Sergio Iavicoli[l], Paul A. Landsbergis[m], Maria-Inti Metzendorf[n], Rebecca L. Morgan[o], Daniela V. Pachito[p], Hynek Pikhart[q], Bernd Richter[n], Mattia Roncaioli[i], Reiner Rugulies[r,s,t], Peter L. Schnall[u], Grace Sembajwe[v,w], Xavier Trudel[d], Akizumi Tsutsumi[x], Tracey J. Woodruff[y], Johannes Siegrist[z,1]

Environment International 155 (2021) 106629

Contents lists available at ScienceDirect

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Systematic review

The effect of exposure to long working hours on depression: A systematic review and meta-analysis from the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury

Reiner Rugulies [a,b,c,*], Kathrine Sørensen [a], Cristina Di Tecco [d], Michela Bonafede [d], Bruna M. Rondinone [d], Seoyeon Ahn [e], Emiko Ando [f], Jose Luis Ayuso-Mateos [g,h,i], Maria Cabello [g,h], Alexis Descatha [j,k,l], Nico Dragano [m], Quentin Durand-Moreau [n], Hisashi Eguchi [o,p], Junling Gao [q], Lode Godderis [r,s], Jaeyoung Kim [t], Jian Li [u], Ida E.H. Madsen [a], Daniela V. Pachito [v], Grace Sembajwe [w,x], Johannes Siegrist [y], Kanami Tsuno [z], Yuka Ujita [aa], JianLi Wang [ab], Amy Zadow [ac], Sergio Iavicoli [d], Frank Pega [ad]

Environment International 142 (2020) 105746

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Environment International

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The effect of exposure to long working hours on stroke: A systematic review and meta-analysis from the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury

Alexis Descatha[a,b,c,d,*,1], Grace Sembajwe[e,1], Frank Pega[f], Yuka Ujita[g], Michael Baer[h], Fabio Boccuni[i], Cristina Di Tecco[i], Clement Duret[b], Bradley A. Evanoff[j], Diana Gagliardi[i], Lode Godderis[k,l], Seong-Kyu Kang[m], Beon Joon Kim[n], Jian Li[o], Linda L. Magnusson Hanson[p], Alessandro Marinaccio[i], Anna Ozguler[h,q], Daniela Pachito[r], John Pell[s], Fernando Pico[t], Matteo Ronchetti[i], Yves Roquelaure[a], Reiner Rugulies[u,v,w], Martijn Schouteden[l], Johannes Siegrist[x], Akizumi Tsutsumi[y], Sergio Iavicoli[i,1]

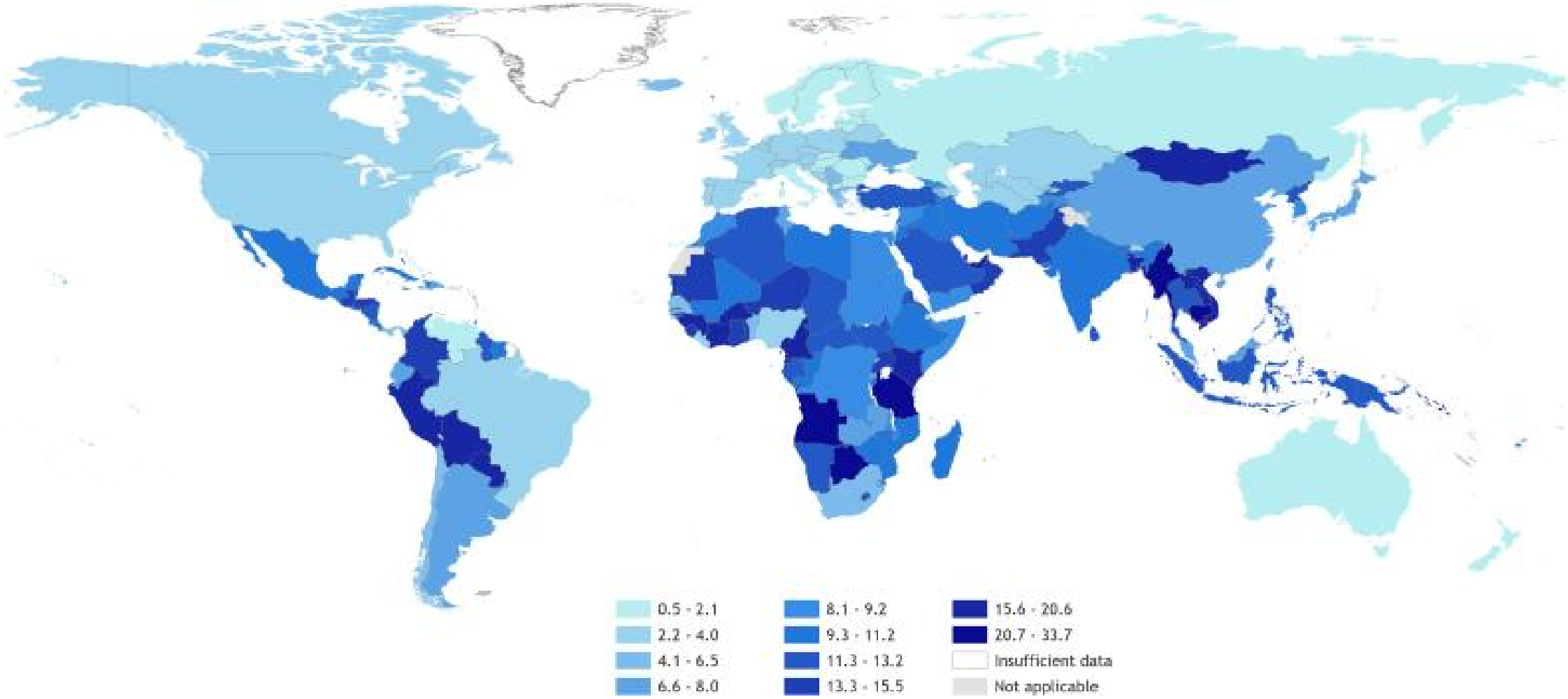
Environment International

Volume 146, January 2021, 106205

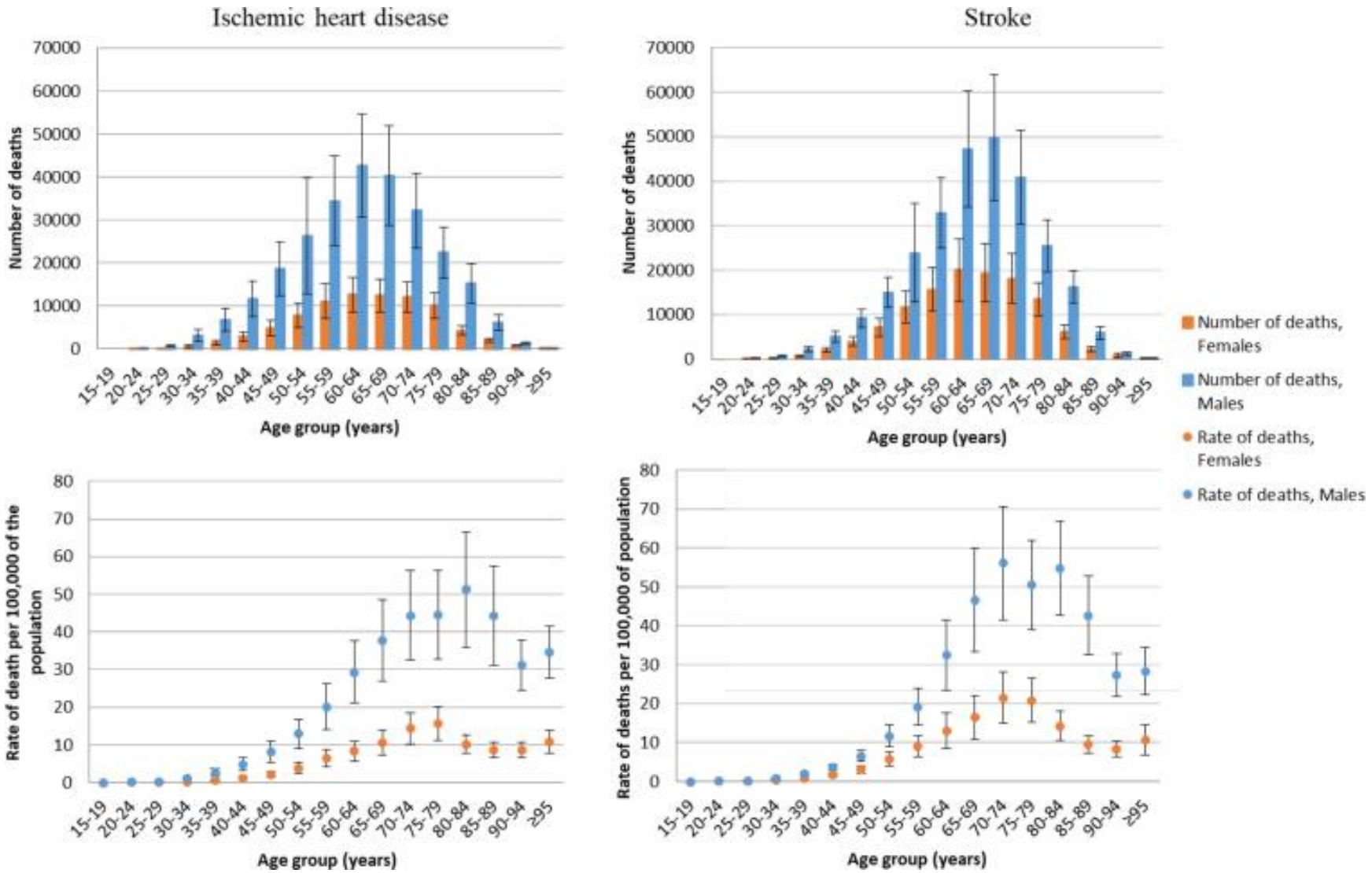
The effect of exposure to long working hours on alcohol consumption, risky drinking and alcohol use disorder: A systematic review and meta-analysis from the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury

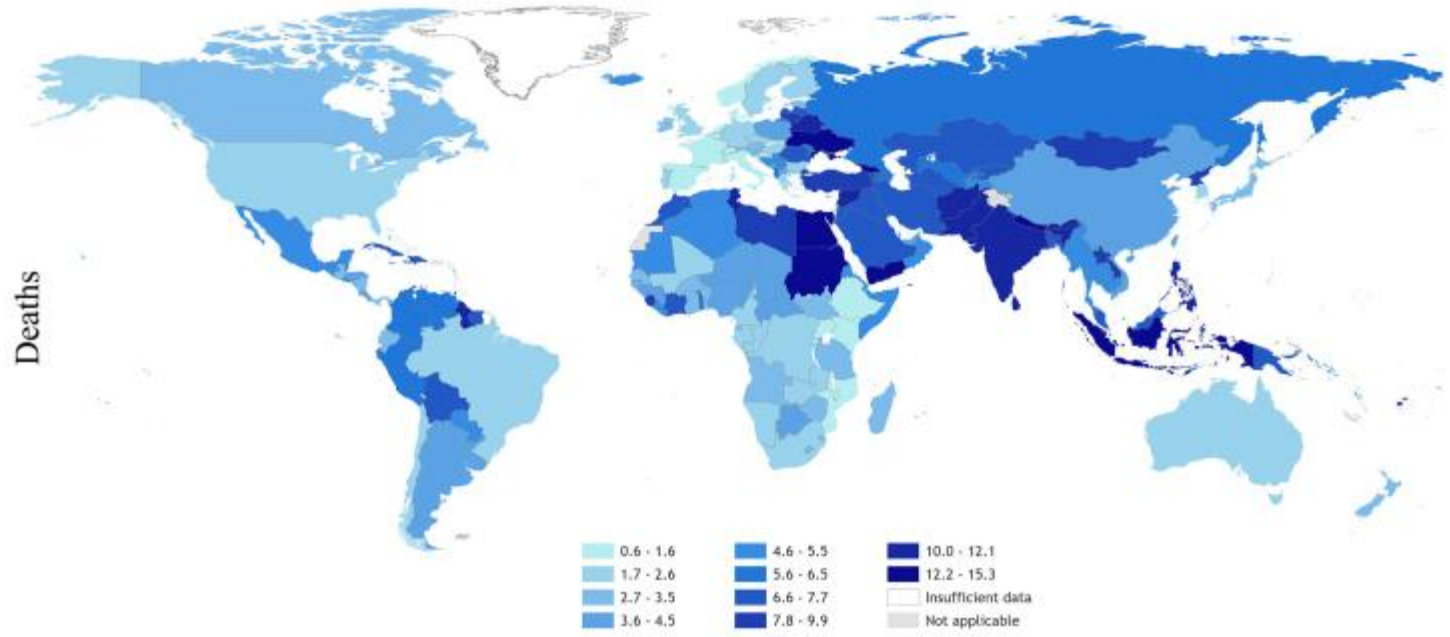
Daniela V. Pachito [a, b, 1], Frank Pega [c] ✉, Jelena Bakusic [d] ✉, Emma Boonen [e] ✉, Els Clays [f] ✉, Alexis Descatha [g, h, i] ✉, Ellen Delvaux [e, j] ✉, Dirk De Bacquer [f] ✉, Karoliina Koskenvuo [k, l] ✉, Hannes Kröger [m] ✉, Marie-Claire Lambrechts [d, n] ✉, Carolina O.C. Latorraca [o], Jian Li [p] ✉, Ana L. Cabrera Martimbianco [q, r, s], Rachel Riera [a, o, t], Reiner Rugulies [u, v, w] ✉, Grace Sembajwe [x, y] ✉, Johannes Siegrist [z] ✉ ... Lode Godderis [d, e] [1] ✉

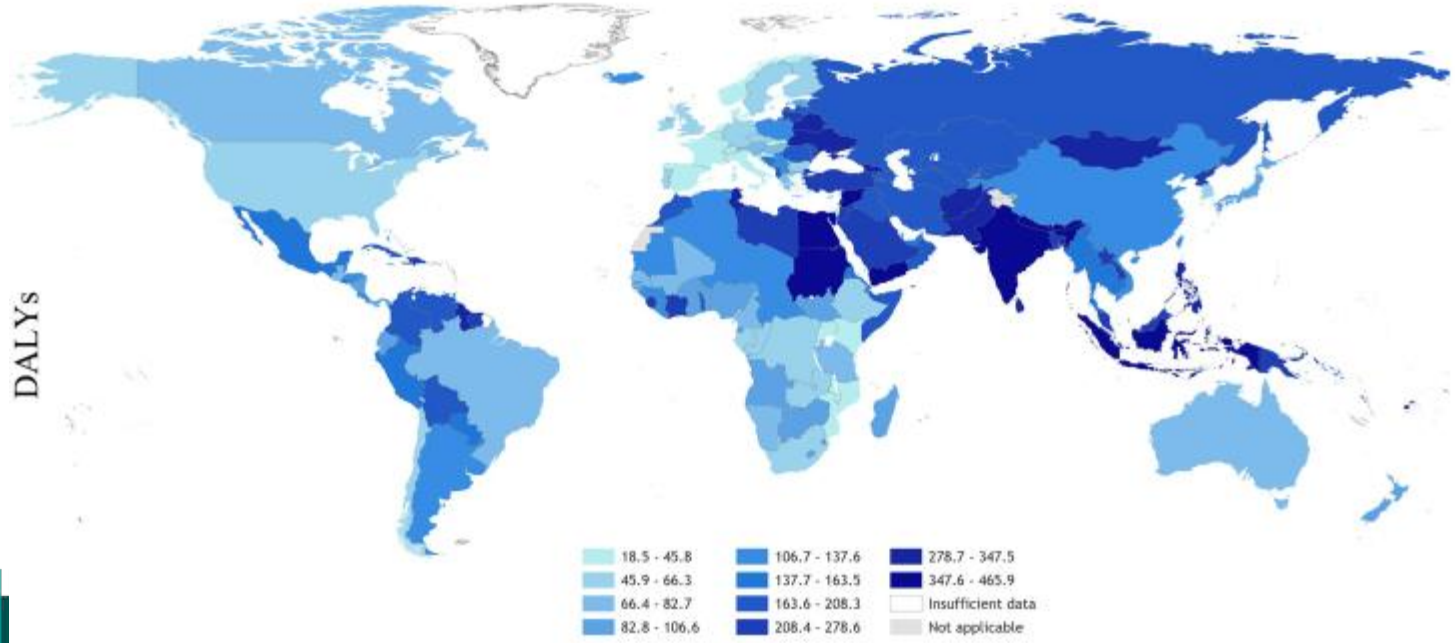
WHO/ILO Joint Estimates of cardiovascular disease from long working hours



WHO/ILO Joint Estimates of cardiovascular disease from long working hours







745,000 people died from ischemic heart disease & stroke attributable to exposure to long working hours in 2016

WHO/ILO Joint Estimates of cardiovascular disease from long working hours

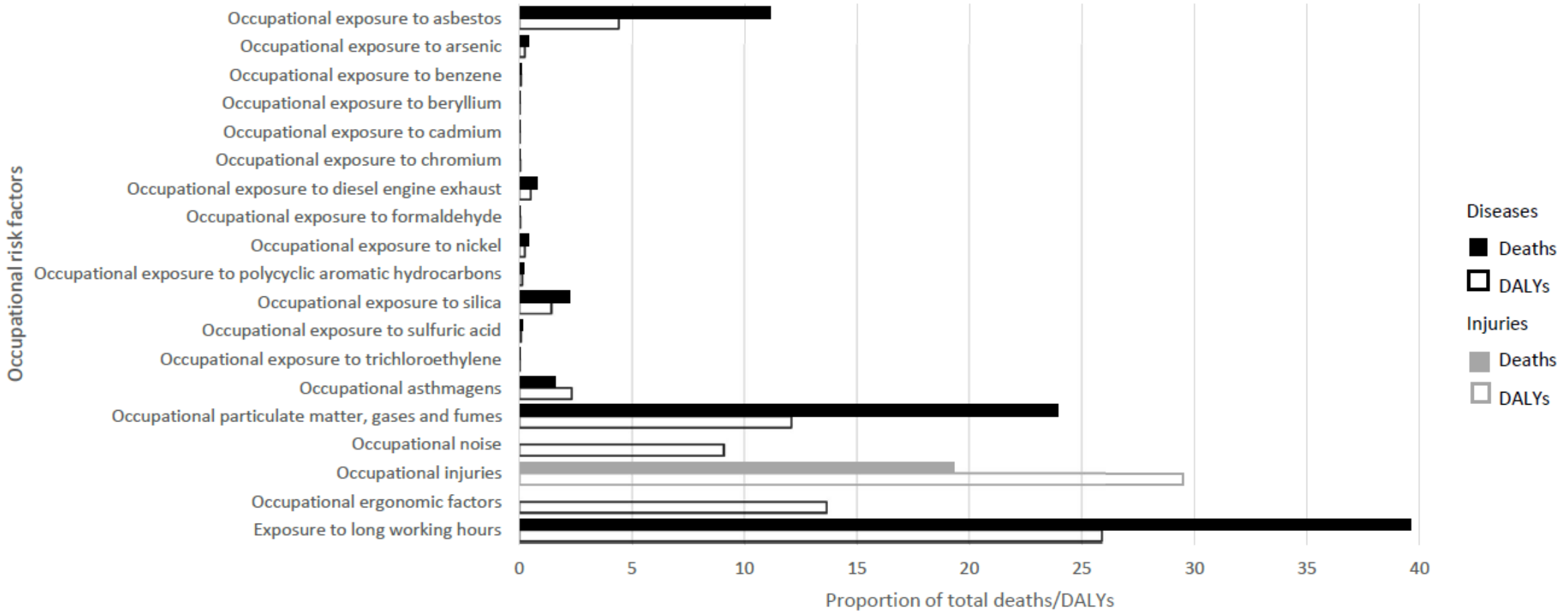


Figure 1. Total number of work-related deaths and DALYs, by occupational risk factor, 183 countries, for the year 2016. Source: WHO and ILO (20).

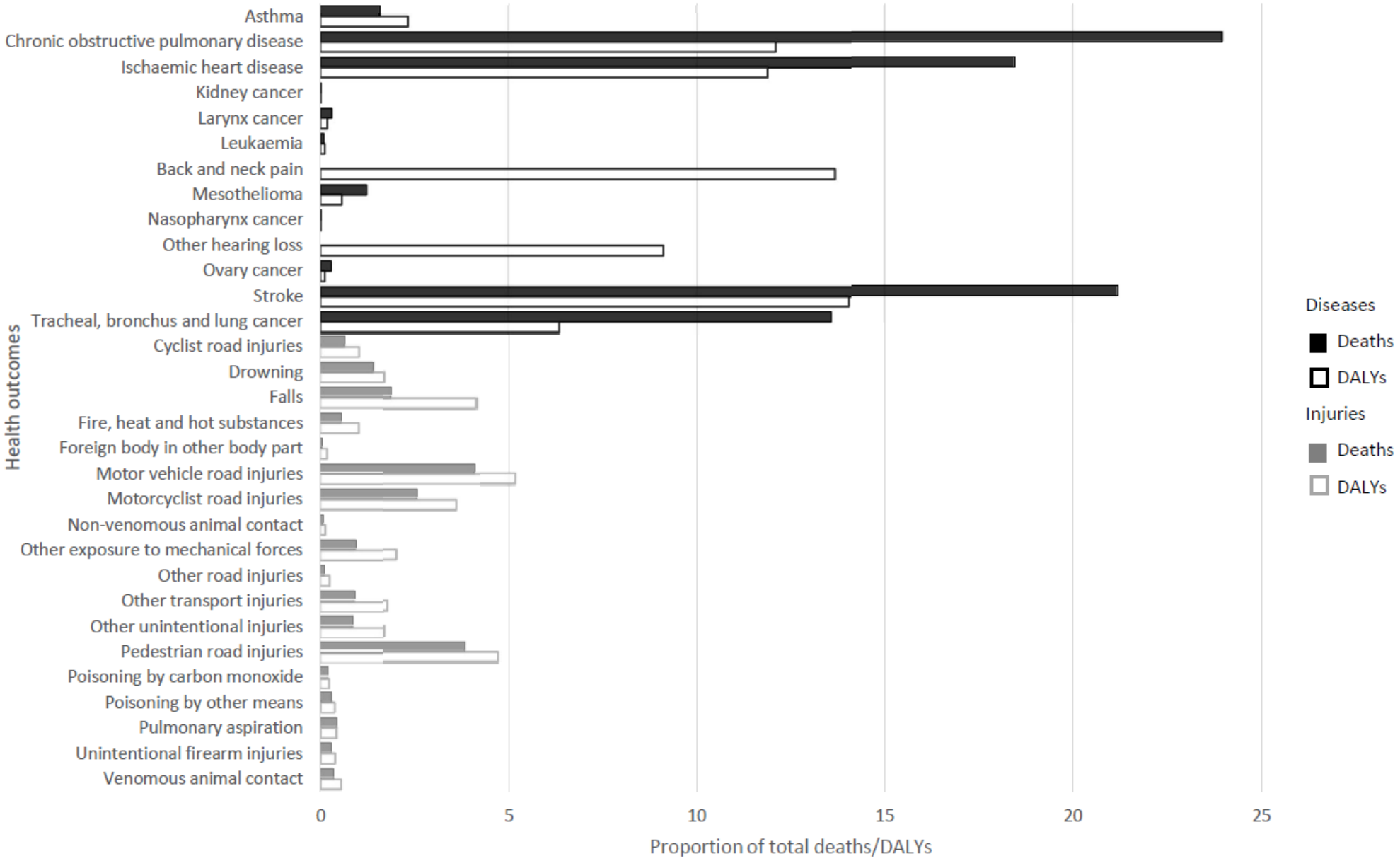


Figure 2. Total number of work-related deaths and DALYs, by health outcome, 183 countries, for the year 2016. Source: WHO and ILO (20).

I thank the co-lead reviewers and working group of individual experts (for their great contributions

More information?

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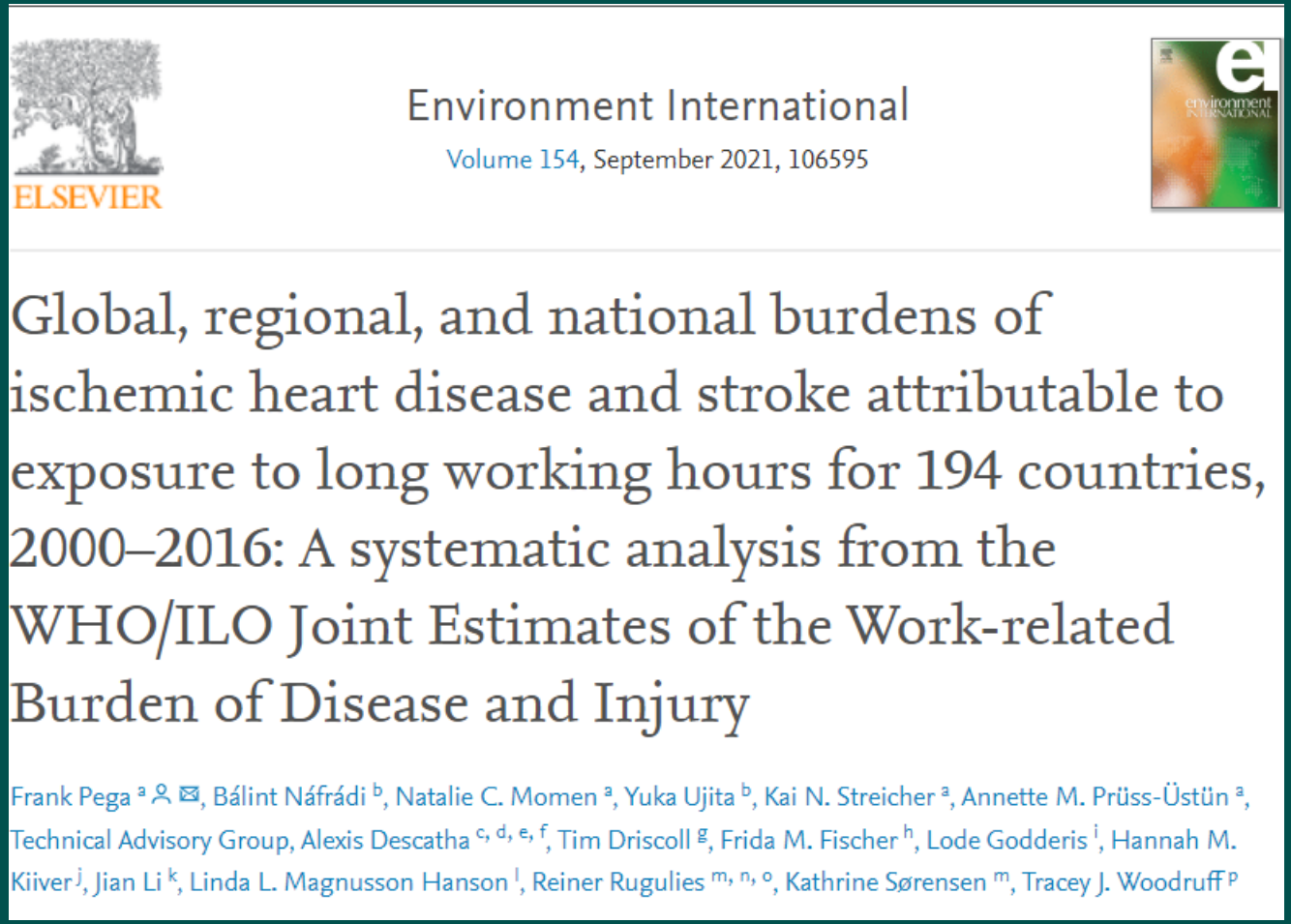

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Environment International

Volume 154, September 2021, 106595

Global, regional, and national burdens of ischemic heart disease and stroke attributable to exposure to long working hours for 194 countries, 2000–2016: A systematic analysis from the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury

Frank Pega [a], Bálint Náfrádi [b], Natalie C. Momen [a], Yuka Ujita [b], Kai N. Streicher [a], Annette M. Prüss-Üstün [a], Technical Advisory Group, Alexis Descatha [c, d, e, f], Tim Driscoll [g], Frida M. Fischer [h], Lode Godderis [i], Hannah M. Kiiver [j], Jian Li [k], Linda L. Magnusson Hanson [l], Reiner Rugulies [m, n, o], Kathrine Sørensen [m], Tracey J. Woodruff [p]