**Working conditions and tuberculosis mortality in England and Wales, 1890-1912: a retrospective analysis of routinely collected data**

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Online data supplement

Table S1. Exposed occupations (involving high levels of indoor contact), in descending order of mortality rate.

|  |  |  |  |
| --- | --- | --- | --- |
| **Occupation** | **Person-years** | **Number of deaths from phthisis** | **Crude mortality rate per 100,000 per year** |
| Tin miner | 68091 | 455 | 668.2 |
| Lead miner | 39072 | 179 | 458.1 |
| Copper miner | 5571 | 25 | 448.8 |
| Barmen | 86949 | 345 | 396.8 |
| Musician, music-master | 189324 | 657 | 347.0 |
| Potter; earthenware, &c. manufacturer | 320700 | 995 | 310.3 |
| Hairdresser | 289224 | 778 | 269.0 |
| Glass manufacture | 225423 | 606 | 268.8 |
| Waiters | 69933 | 187 | 267.4 |
| Tinplate goods makers | 59205 | 156 | 263.5 |
| Cotton, flax, linen, manufacture | 1057494 | 2527 | 239.0 |
| Silk, satin, crape, &c. manufacture | 98097 | 234 | 238.5 |
| Hosiery manufacture | 136533 | 321 | 235.1 |
| Nail, anchor, chain, and other iron and steel manufactures | 1257126 | 2874 | 228.6 |
| Stationery, envelope, cardboard box, &c. manufacture | 41172 | 92 | 223.5 |
| Carpet, rag, manufacture | 66867 | 147 | 219.8 |
| Lace manufacture | 118980 | 257 | 216.0 |
| Cycle makers | 82434 | 174 | 211.1 |
| Wool, worsted, manufacture | 750831 | 1538 | 204.8 |
| Nail, bolt, lock, key - makers | 54765 | 95 | 173.5 |
| Wool - sorting, carding & combing processes | 48762 | 84 | 172.3 |
| Cotton blow room hands | 28545 | 49 | 171.7 |
| Cotton stripers & grinders | 14940 | 25 | 167.3 |
| Straw plait, straw hat, straw bonnet - manufacture | 15078 | 23 | 152.5 |
| Iron and steel manufacture; iron goods makers | 862977 | 1314 | 152.3 |
| Ironstone miner | 103764 | 152 | 146.5 |
| Cotton manufacture | 642639 | 931 | 144.9 |
| Tallow, soap manufacture | 163437 | 235 | 143.8 |
| Paper manufacture | 127476 | 182 | 142.8 |
| Anchor, chain manufacture; blacksmith | 406050 | 574 | 141.4 |
| Schoolmaster, teacher | 537981 | 728 | 135.3 |
| Cycle and motor manufacture | 2532 | 3 | 118.5 |
| Coal miner | 5858274 | 6138 | 104.8 |
| Physician, surgeon, general practitioner | 197925 | 202 | 102.1 |
| Coach, motor, railway carriage, tram car, &c. - makers | 365178 | 346 | 94.7 |
| Iron - miners, quarriers | 67887 | 60 | 88.4 |
| Clergyman, priest, minister | 337213 | 274 | 81.3 |

Table S2. Unexposed occupations (involving little indoor contact) in descending order of mortality rate.

|  |  |  |  |
| --- | --- | --- | --- |
| **Occupation** | **Person-years** | **Number of deaths from phthisis** | **Crude mortality rate per 100,000 per year** |
| Dock labourer, wharf labourer | 745317 | 2669 | 358.1 |
| Bricklayer, mason, builder | 2187492 | 5261 | 240.5 |
| Bargeman, lighterman, waterman | 264381 | 516 | 195.2 |
| Carman, carrier, &c | 2210298 | 4256 | 192.6 |
| Artist, engraver, sculptor, architect | 180415 | 337 | 186.8 |
| Fisherman | 221730 | 302 | 136.2 |
| Labourer, &c., in agricultural districts | 2019072 | 2676 | 132.5 |
| Engine driver, stoker, fireman (not railway, marine, nor agricultural) | 899688 | 1068 | 118.7 |
| Coke burner | 26472 | 29 | 109.5 |
| Gardener, nurseryman, seedsman | 1907535 | 2080 | 109.0 |
| Farm labourer, farm servant | 5646978 | 6112 | 108.2 |
| Railway engine driver, stoker | 533208 | 490 | 91.9 |
| Farmer, grazier, farmer's son, &c | 2624127 | 2365 | 90.1 |
| Motor car, motor van drivers | 129204 | 116 | 89.8 |
| Gamekeeper | 103227 | 82 | 79.4 |
| Platelayers, gangers, packers | 160338 | 124 | 77.3 |

Table s3. Uncategorised occupations in descending order of mortality rate.

| **Occupation** | **Person-years** | **Number of deaths from phthisis** | **Crude mortality rate per 100,000 per year** |
| --- | --- | --- | --- |
| Costermonger, hawker, &c | 434667 | 2276 | 523.6 |
| Inn, hotel-servant | 276330 | 1253 | 453.4 |
| Tool, scissors, file, saw, needle, maker | 391872 | 1470 | 375.1 |
| General labourer | 5719986 | 20616 | 360.4 |
| Chimney sweep, soot merchant | 44214 | 155 | 350.6 |
| Slate - quarriers, workers | 39828 | 131 | 328.9 |
| Gunsmith | 79140 | 259 | 327.3 |
| Inn-keeper, publican; spirit, wine, beer, dealer | 761346 | 2463 | 323.5 |
| Bookbinder | 108987 | 349 | 320.2 |
| Seaman, &c, merchant service | 933986 | 2974 | 318.4 |
| Patent fuel manufacture | 3459 | 11 | 318.0 |
| Brush, broom maker; hair, bristle worker | 56058 | 177 | 315.7 |
| Printer | 846696 | 2632 | 310.9 |
| Stone getters, dressers; masons | 350007 | 1065 | 304.3 |
| Tobacconist | 125352 | 375 | 299.2 |
| Shoemaker | 1733493 | 5180 | 298.8 |
| Hatter | 144618 | 432 | 298.7 |
| Brewer | 245667 | 708 | 288.2 |
| Stone, slate, quarrier | 359598 | 1023 | 284.5 |
| Tailor | 1207362 | 3319 | 274.9 |
| General shopkeeper | 278283 | 749 | 269.2 |
| Inn, hotel, &c. – servants | 255330 | 687 | 269.1 |
| Brass, bronze-manufacturers, founders, finishers, workers | 269047 | 719 | 267.2 |
| Wood turner, cooper, &c | 344682 | 914 | 265.2 |
| Cabinet maker, &c | 788046 | 2074 | 263.2 |
| Currier, &c | 213162 | 547 | 256.6 |
| Tobacco manufacture | 23841 | 61 | 255.9 |
| Publisher, bookseller, stationer, &c | 215928 | 552 | 255.6 |
| Locksmith, bellhanger, gasfitter | 125637 | 321 | 255.5 |
| Coach and cab service, groom, &c | 1693758 | 4257 | 251.3 |
| Copper, tin, zinc, lead, brass, &c., worker and dealer | 838047 | 2094 | 249.9 |
| Coal heaver | 230313 | 562 | 244.0 |
| Commercial clerk, insurance service | 1813653 | 4332 | 238.9 |
| Slater, tiler | 74808 | 177 | 236.6 |
| Law clerk | 279468 | 657 | 235.1 |
| Watch, clock, phil. inst., maker, jeweller, &c | 640563 | 1505 | 234.9 |
| Furrier, skinner | 25812 | 60 | 232.5 |
| Plumber, painter, glazier | 1422954 | 3302 | 232.1 |
| Wool, silk, cotton, &c.; dyer, printer, &c | 460947 | 1055 | 228.9 |
| Paperhanger, plasterer, whitewasher | 315297 | 718 | 227.7 |
| Draper, Manchester warehouseman | 583953 | 1326 | 227.1 |
| Photographer | 36297 | 82 | 225.9 |
| Piano, organ – makers | 42852 | 94 | 219.4 |
| Insurance agents | 162756 | 350 | 215.0 |
| Beer bottlers; cellarmen | 44232 | 95 | 214.8 |
| Brass, bronze - manufacture; brassfounders | 36804 | 79 | 214.7 |
| Messenger, porter, &c. (not railway nor government) | 1053783 | 2250 | 213.5 |
| Railway labourers | 78636 | 166 | 211.1 |
| Copper manufacture; copper workers; coppersmiths | 37665 | 79 | 209.7 |
| Commercial clerks | 1079148 | 2227 | 206.4 |
| Rope, twine, cord-maker | 74280 | 148 | 199.2 |
| Painters, decorators | 570453 | 1135 | 199.0 |
| Commercial traveller | 587040 | 1163 | 198.1 |
| Railway official, clerk | 592272 | 1172 | 197.9 |
| Wire - drawers makers, workers, weavers | 57771 | 113 | 195.6 |
| India rubber, gutta percha worker; waterproof goods maker | 85056 | 164 | 192.8 |
| Gas works service | 400761 | 765 | 190.9 |
| Coach, carriage-maker | 269190 | 507 | 188.3 |
| Blacksmith, whitesmith | 812868 | 1513 | 186.1 |
| Carpenter, joiner | 2101740 | 3911 | 186.1 |
| Fruiterer, greengrocer | 364134 | 670 | 184.0 |
| Engine, machine, boiler, maker, fitter; millwright | 2678403 | 4892 | 182.6 |
| Dealers in paper, prints, books & stationery | 124857 | 222 | 177.8 |
| Corn miller | 133497 | 235 | 176.0 |
| Saddler, harness maker | 309701 | 541 | 174.7 |
| Chemist, druggist | 219285 | 383 | 174.7 |
| Fishmonger, poulterer | 272442 | 472 | 173.2 |
| Tramway service | 177794 | 308 | 173.2 |
| Baker, confectioner | 934545 | 1615 | 172.8 |
| Domestic indoor servant | 454572 | 785 | 172.7 |
| Butcher | 973707 | 1648 | 169.3 |
| Scientific weighing and general instrument makers | 70254 | 117 | 166.5 |
| Bread, biscuit, cake, &c. – makers | 239880 | 378 | 157.6 |
| Shipwright, &c. (wood and iron) | 438711 | 665 | 151.6 |
| Wheelwright | 240443 | 358 | 148.9 |
| Tanner, fellmonger | 90912 | 135 | 148.5 |
| Railway platelayer, railway road, clay, sand, &c., labourer | 803640 | 1167 | 145.2 |
| Railway guard, porter, pointsman, &c | 1110045 | 1575 | 141.9 |
| Manufacturing chemist | 228132 | 320 | 140.3 |
| Grocer, &c | 1328613 | 1853 | 139.5 |
| Sawyer | 283749 | 394 | 138.9 |
| Ironmonger | 225348 | 312 | 138.5 |
| Millers, cereal food manufacture | 73620 | 101 | 137.2 |
| Civil service (messengers, &c.), including retired | 218889 | 297 | 135.7 |
| Milkseller, cheesemonger, &c | 385446 | 518 | 134.4 |
| Maltster | 84756 | 112 | 132.1 |
| Lithographer; copper and steel plate printer | 38238 | 49 | 128.1 |
| Electrical apparatus makers, electricians, electrical fitters | 251310 | 318 | 126.5 |
| Coal, coke – merchant, dealer | 235896 | 290 | 122.9 |
| Civil service (officers and clerks), including retired | 225699 | 277 | 122.7 |
| Barrister, solicitor | 191934 | 235 | 122.4 |
| Furniture dealers | 72468 | 87 | 120.1 |
| Shipbuilding | 322626 | 378 | 117.2 |
| Plaster, cement – manufacture | 29919 | 35 | 117.0 |
| Provision dealers | 56814 | 59 | 103.8 |
| Brick, tile, maker, burner | 432972 | 430 | 99.3 |
| Builders | 132393 | 126 | 95.2 |
| Insurance - officials, clerks | 127716 | 121 | 94.7 |
| Corn, flour, seed - merchants, dealers | 55704 | 48 | 86.2 |
| Bankers, bank officials, clerks | 128043 | 110 | 85.9 |
| Electricity supply | 44418 | 36 | 81.0 |

Table S4. High risk occupations excluded in sensitivity analysis.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Healthcare professionals** | **Farmers** | **Occupations exposed to silica dust** |
| Exposed occupations | Physician, surgeon, general practitioner |  | Coal miner  Copper miner  Ironstone miner  Lead miner  Tin miner  Iron miners, quarriers  Potter, earthenware, manufacturer |
| Unexposed occupations |  | Farm labourer, farm servant  Farmer, grazier, farmer's son, &c | Coke burner |
| Uncategorised occupations |  |  | Tool, scissors, file, saw, needle makers  Cutlers  Stone getters, dressers, masons |

Table S5. Crude and adjusted\* associations between occupation category and mortality from ‘phthisis’ in Poisson regression (with overdispersion), excluding uncategorised occupations.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | | Crude Rate Ratio (95% CI) | p-value | Adjusted Rate Ratio (95% CI) | p-value |
| Occupation Category | Unexposed | Reference | <0.0001 | Reference | <0.0001 |
| Exposed | 1.13 (1.02-1.25]) | 1.43 (1.33-1.54) |

\* Adjusted for age group, year and socioeconomic position.

RR = rate ratio; CI = confidence interval

Table S6. Crude and adjusted\* associations between occupation category and mortality from ‘phthisis’ in Poisson regression (with overdispersion) excluding the uncategorised occupations and occupations at risk of TB for other reasons.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | | Crude Rate Ratio (95% CI) | p-value | Adjusted Rate Ratio (95% CI) | p-value |
| Occupation Category | Unexposed | Reference | 0.024 | Reference | <0.0001 |
| Exposed | 1.12 (1.01-1.24) | 1.64 (1.52-1.76) |

\* Adjusted for age group, year and socioeconomic position.

RR = rate ratio; CI = confidence interval

Table S7. Crude and adjusted\* associations between occupation category and mortality from ‘phthisis’ in Poisson regression (with overdispersion), excluding general labourers, the largest uncategorised occupation.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | | Crude Rate Ratio (95% CI) | p-value | Adjusted Rate Ratio (95% CI) | p-value |
| Occupation Category | Unexposed | Reference | <0.0001 | Reference | <0.0001 |
| Exposed | 1.13 (1.04-1.23) | 1.30 (1.23-1.39) |
| Uncategorised | 1.52 (1.42-1.63) | 1.62 (1.54-1.70) |

\* Adjusted for age group, year and socioeconomic position.

RR = rate ratio; CI = confidence interval

Table S8. Crude and adjusted\* associations between occupation category and mortality from ‘phthisis’ in Poisson regression (with overdispersion), stratified by denominator size.

|  |  |  |  |
| --- | --- | --- | --- |
| Tertile of denominator | Occupation category | Crude RR (95% CI) | Adjusted RR (95% CI) |
| 1 (smallest) | Little indoor contact | Reference | Reference |
|  | Indoor contact | 2.02 (1.51-2.71) | 1.47 (1.16-1.86) |
|  | Uncategorised | 1.60 (1.20-2.12) | 1.36 (1.08-1.72) |
|  |  |  |  |
| 2 | Little indoor contact | Reference | Reference |
|  | Indoor contact | 1.41 (1.12-1.77) | 1.62 (1.39-1.89) |
|  | Uncategorised | 1.52 (1.24-1.86) | 1.61 (1.40-1.85) |
|  |  |  |  |
| 3 | Little indoor contact | Reference | Reference |
|  | Indoor contact | 1.02 (0.87-1.18) | 1.26 (1.14-1.38) |
|  | Uncategorised | 1.67 (1.50-1.86) | 1.67 (1.55-1.80) |

\* Adjusted for age group, year and socioeconomic position.

RR = rate ratio; CI = confidence interval

Table S9. Crude and adjusted\* associations between occupation category and mortality from ‘phthisis’ in Poisson regression (with overdispersion), stratified by denominator size and excluding high risk groups

|  |  |  |  |
| --- | --- | --- | --- |
| Tertile of denominator | Occupation category | Crude RR (95% CI) | Adjusted RR (95% CI) |
| 1 (smallest) | Little indoor contact | Reference | Reference |
|  | Indoor contact | 1.67 (1.30-2.15) | 1.28 (1.05-1.55) |
|  | Uncategorised | 1.52 (1.19-1.93) | 1.33 (1.10-1.60) |
|  |  |  |  |
| 2 | Little indoor contact | Reference | Reference |
|  | Indoor contact | 1.42 (1.13-1.78) | 1.60 (1.37-1.87) |
|  | Uncategorised | 1.48 (1.22-1.79) | 1.54 (1.35-1.76) |
|  |  |  |  |
| 3 | Little indoor contact | Reference | Reference |
|  | Indoor contact | 1.05 (0.88-1.26) | 1.17 (1.04-1.33) |
|  | Uncategorised | 1.35 (1.20-1.53) | 1.51 (1.39-1.64) |

\* Adjusted for age group, year and socioeconomic position.

RR = rate ratio; CI = confidence interval

Table S10: Crude and adjusted\* associations between occupation category and mortality from ‘phthisis’ stratified by denominator size from random effects logistic regression.

|  |  |  |  |
| --- | --- | --- | --- |
| Tertile of denominator | Occupation category | Crude OR (95% CI) | Adjusted OR (95% CI) |
| 1 (smallest) | Little indoor contact | Reference | Reference |
|  | Indoor contact | 2.03 (1.39-2.98) | 1.65 (1.19-2.29) |
|  | Uncategorised | 1.51 (1.06-2.15) | 1.44 (1.06-1.95) |
|  |  |  |  |
| 2 | Little indoor contact | Reference | Reference |
|  | Indoor contact | 1.52 (1.10-2.09) | 1.51 (1.13-2.01) |
|  | Uncategorised | 1.49 (1.12-1.98) | 1.44 (1.11-1.86) |
|  |  |  |  |
| 3 | Little indoor contact | Reference | Reference |
|  | Indoor contact | 1.31 (0.90-1.90) | 1.62 (1.12-2.35) |
|  | Uncategorised | 1.44 (1.07-1.93) | 1.74 (1.29-2.35) |
|  |  |  |  |
| Overall | Little indoor contact | Reference | Reference |
|  | Indoor contact | 1.49 (1.18-1.90) | 1.69 (1.33-2.14) |
|  | Uncategorised | 1.50 (1.21-1.86) | 1.71 (1.39-2.11) |

\* Adjusted for age group, year and socioeconomic position.

OR = odds ratio; CI = confidence interval

Table S11: Crude and adjusted\* associations between occupation category and mortality from ‘phthisis’ based on negative binomial regression.

|  |  |  |
| --- | --- | --- |
| Occupation category | Crude RR (95% CI) | Adjusted RR (95% CI)\* |
| Little indoor contact | Referent | Referent |
| Indoor contact | 1.58 (1.43-1.75) | 1.67 (1.55-1.80) |
| Uncategorised | 1.48 (1.36-1.61) | 1.62 (1.52-1.72) |

\* Adjusted for age group, year and socioeconomic position.

RR = rate ratio; CI = confidence interval

Table S12: Crude and adjusted\* associations between occupation category and mortality from ‘phthisis’ based on negative binomial regression, stratified by denominator size.

|  |  |  |  |
| --- | --- | --- | --- |
| Tertile of denominator | Occupation category | Crude RR (95% CI) | Adjusted RR (95% CI) |
| 1 (smallest) | Little indoor contact | Reference | Reference |
|  | Indoor contact | 2.26 (1.77-2.91) | 1.52 (1.23-1.88) |
|  | Uncategorised | 1.62 (1.28-20.6) | 1.30 (1.06-1.60) |
|  |  |  |  |
| 2 | Little indoor contact | Reference | Reference |
|  | Indoor contact | 1.50 (1.25-1.80) | 1.53 (1.34-1.75) |
|  | Uncategorised | 1.51 (1.29-1.77) | 1.50 (1.33-1.69) |
|  |  |  |  |
| 3 | Little indoor contact | Reference | Reference |
|  | Indoor contact | 1.15 (0.99-1.33) | 1.48 (1.34-1.64) |
|  | Uncategorised | 1.48 (1.33-1.65) | 1.73 (1.60-1.87) |

\* Adjusted for age group, year and socioeconomic position.

RR = rate ratio; CI = confidence interval