



A Small Segment of the New Zealand Population with a High Concentration of Service Use

Using Big Data to Tackle Inequalities in Society
The University of Auckland
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COMPASS
RESEARCH CENTRE

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Whare Wānanga o Tāmaki Makaurau

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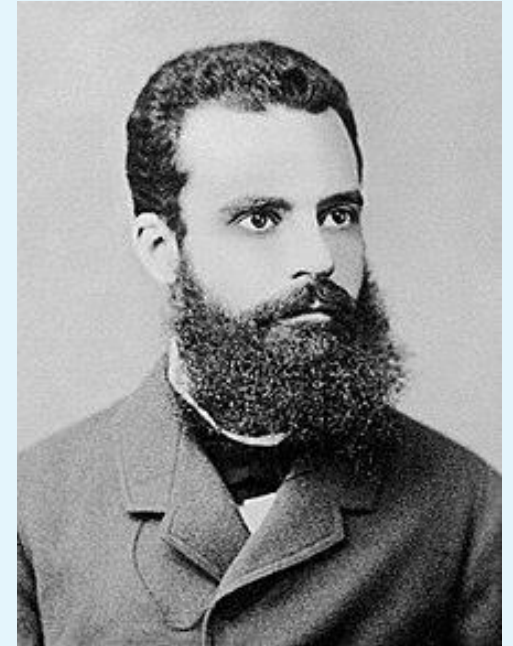
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Pareto principle

- ❑ Vilfredo Pareto (1848–1923)
 - ❑ 20% of the people owned 80% of the land in Italy
- ❑ Pareto principle or 80/20 rule
 - ❑ 80% of the effects come from 20% of the causes
 - Joseph Juran (1904–2008) coined it, paying homage to Pareto
 - ❑ Has been applied to income distribution, exercise training, software bugs, healthcare resources, ...
- ❑ Pareto principle represents a measure of concentration, where $x\%$ of 'stuff' is concentrated among $y\%$ of units
 - ❑ Obvious uses as measure of inequality (Gini)



Concentration of service use et al. in Dunedin Study

- ❑ Dunedin Study (n = 1,037, born in Dunedin, NZ 1972–73) reported that 20% of their sample had
 - 77% of hospital bed nights
 - 80% of benefit months
 - 97% of criminal convictions
 - 52% of accident insurance claims
 - 89% of pharmaceutical prescriptions
 - 82% of fatherless child years
 - 68% of all cigarette pack years smoked
 - 98% of excess obese kilograms
- ❑ Inequalities in childhood SES predicted this unequal distribution
 - ❑ As did other childhood social and neuropsychological factors

- ❑ Dunedin Study is a cohort of one age, from one part of NZ, assessed (mostly) in the years leading up to their 38th birthday
- ❑ Aim: Describe the concentration of service use in NZ population
 - Does concentration differ across sectors? Between males and females? Between different age cohorts?
 - What is the overlap between high use groups in different sectors?
- ❑ Use Integrated Data Infrastructure
 - Focus on top 10% of users

- ❑ Birth cohort approach. Compare seven cohorts:
 - ❑ Ages 22–26, 27–31, 32–36, 37–41, 42–46, 47–51, 52–56 in 2006
 - ❑ 1980–84, 1975–79, 1970–74, 1965–69, 1960–64, 1955–59, 1950–54
- ❑ Across four sectors
 - ❑ Health (Total days in hospital)
 - ❑ Welfare (Total number of days on a benefit)
 - ❑ Crime (Total number of convictions)
 - ❑ Accident insurance claims (Total number of ACC claims)
- ❑ Across ten years
 - ❑ July 2006 – June 2016
 - ❑ Accounting for time out of NZ and deaths

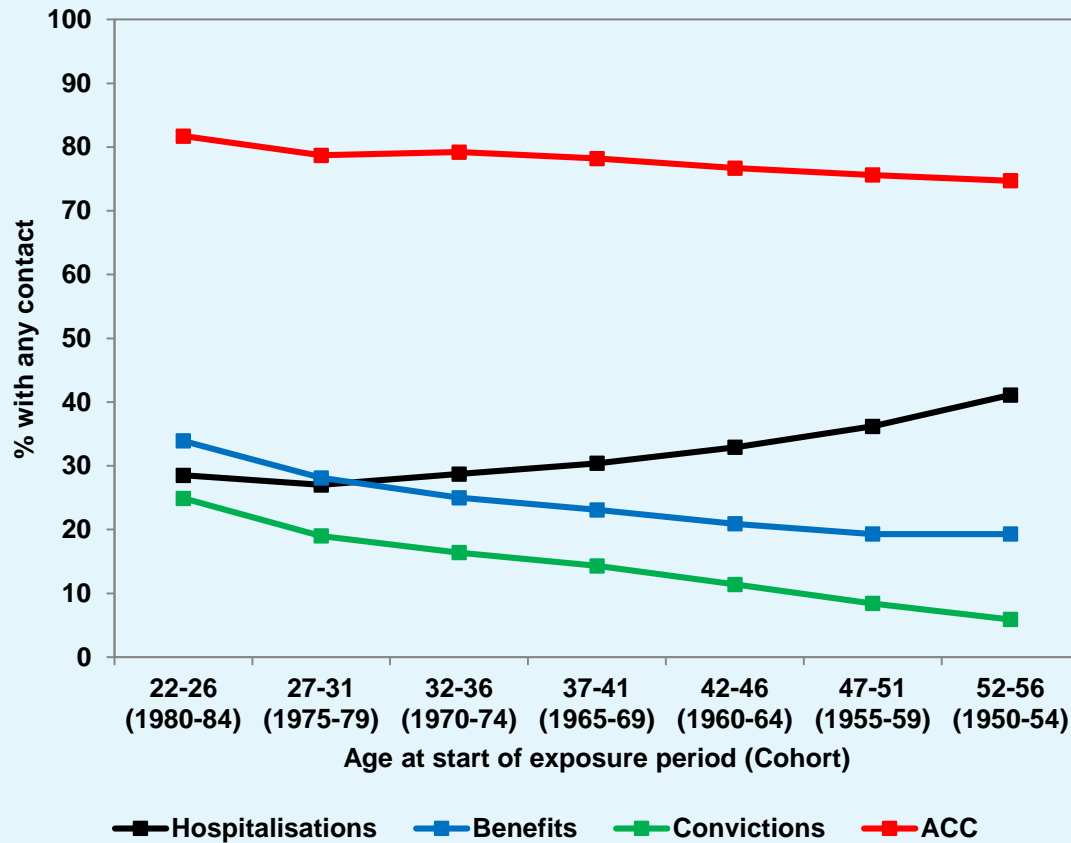
Analysis numbers

	Age 22–26 (1980–84)	Age 27–31 (1975–79)	Age 32–36 (1970–74)	Age 37–41 (1965–69)	Age 42–46 (1960–64)	Age 47–51 (1955–59)	Age 52–56 (1950–54)
Total N Born	255,480	271,338	313,503	310,350	324,672	297,744	262,443
Deceased prior to exposure period	5,652	7,533	11,328	13,731	17,220	18,744	21,069
Total N Alive during exposure period	249,831	263,805	302,181	296,616	307,452	279,003	241,374
Overseas during entire exposure period	5,571	8,529	10,947	9,036	7,335	5,772	4,695
Final N, after restrictions	244,260	255,273	291,228	287,580	300,117	273,234	236,676
<u>Deceased</u> during exposure period	1,329	1,590	2,577	3,789	6,003	7,830	10,353
<u>Overseas</u> for part of exposure period	171,066	167,850	195,990	190,344	194,853	172,374	145,440
<u>Overseas</u> OR <u>Deceased</u>	171,978	168,909	197,703	192,840	198,627	177,198	151,686
Years of follow-up (mean)	7.83	7.96	8.09	8.25	8.31	8.35	8.41

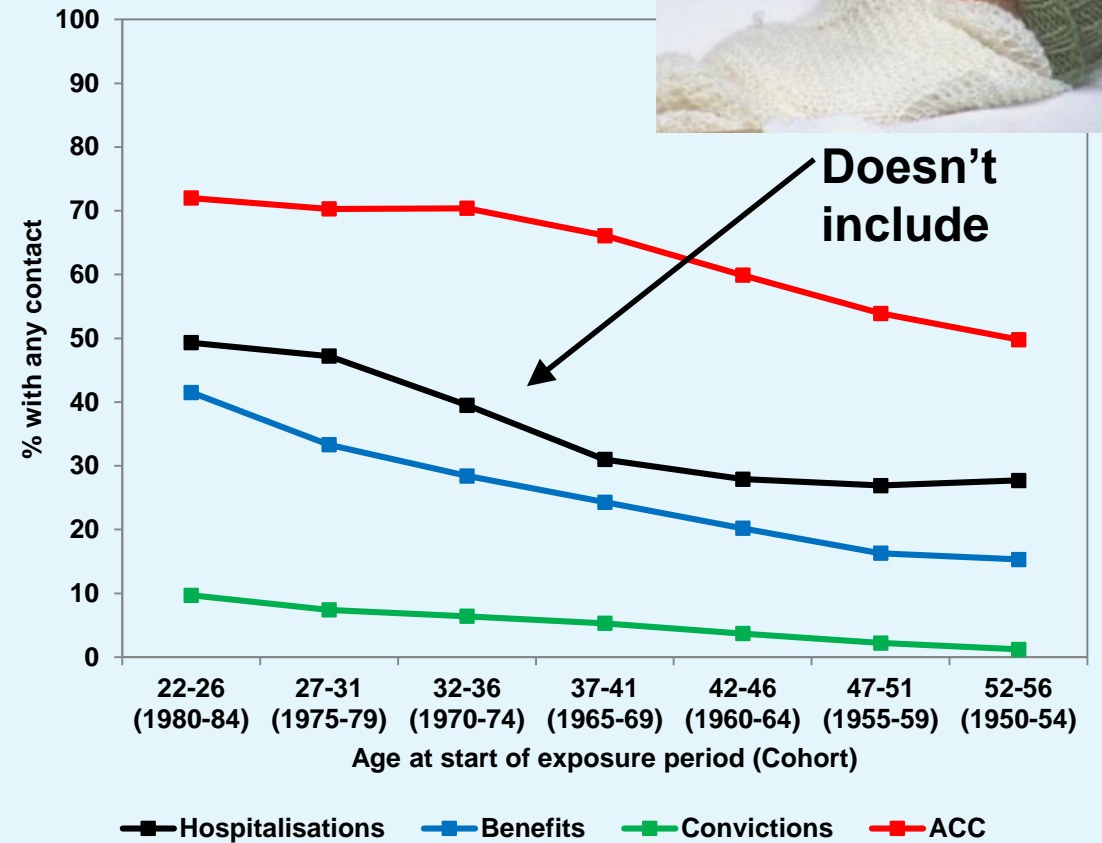
Service use prevalence across sectors, cohorts and gender



Men



Women



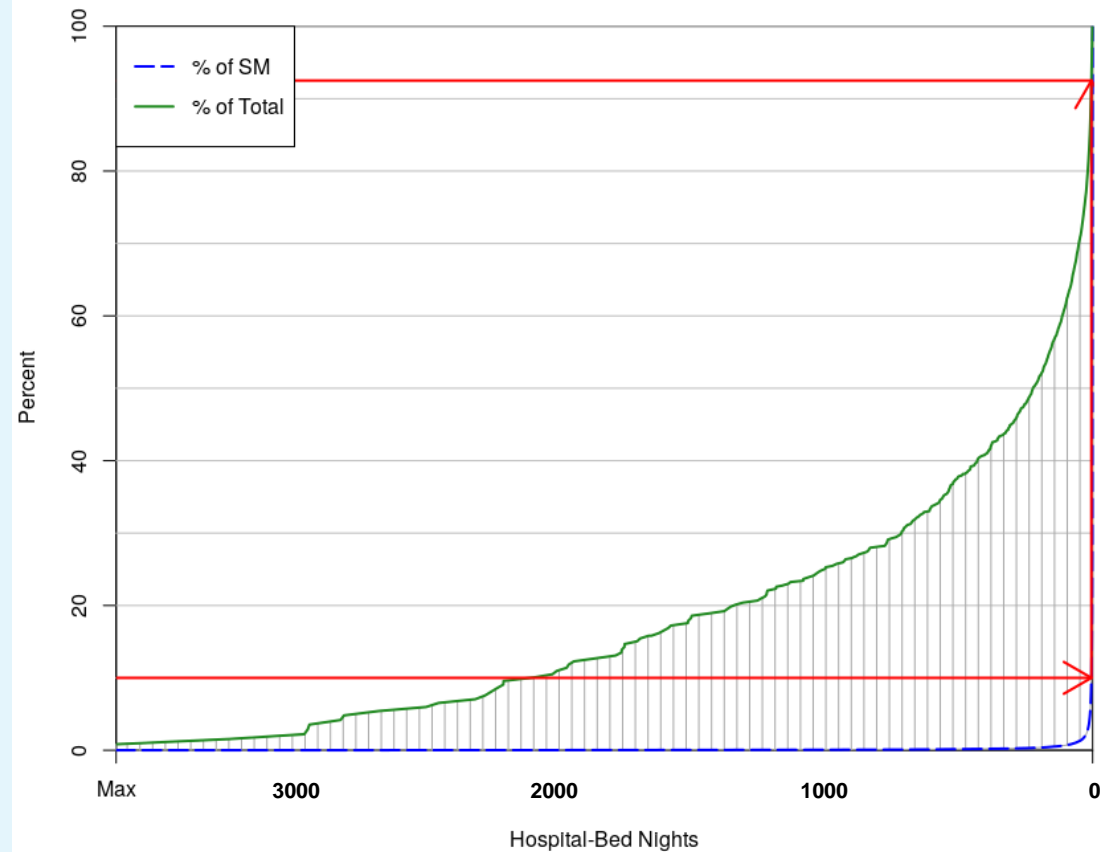
Doesn't include

New Zealand

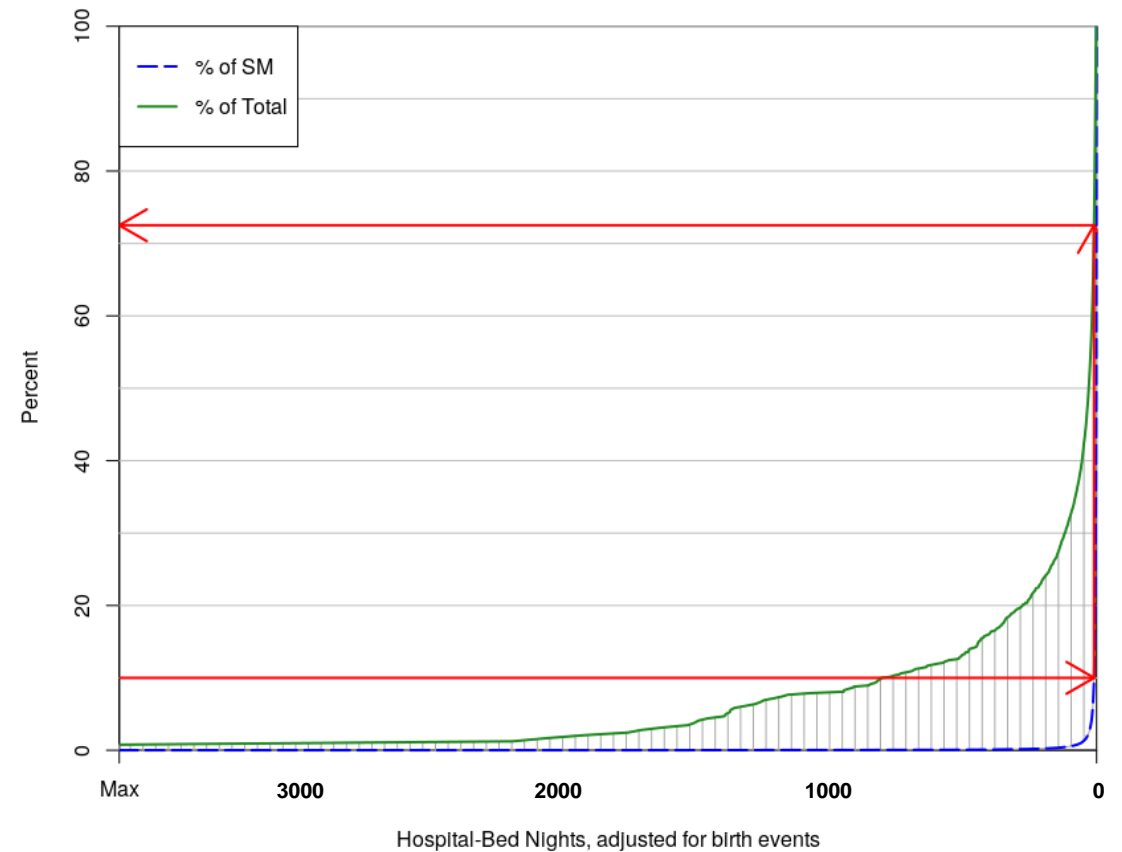
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Concentration of hospitalisations (total length of stay)

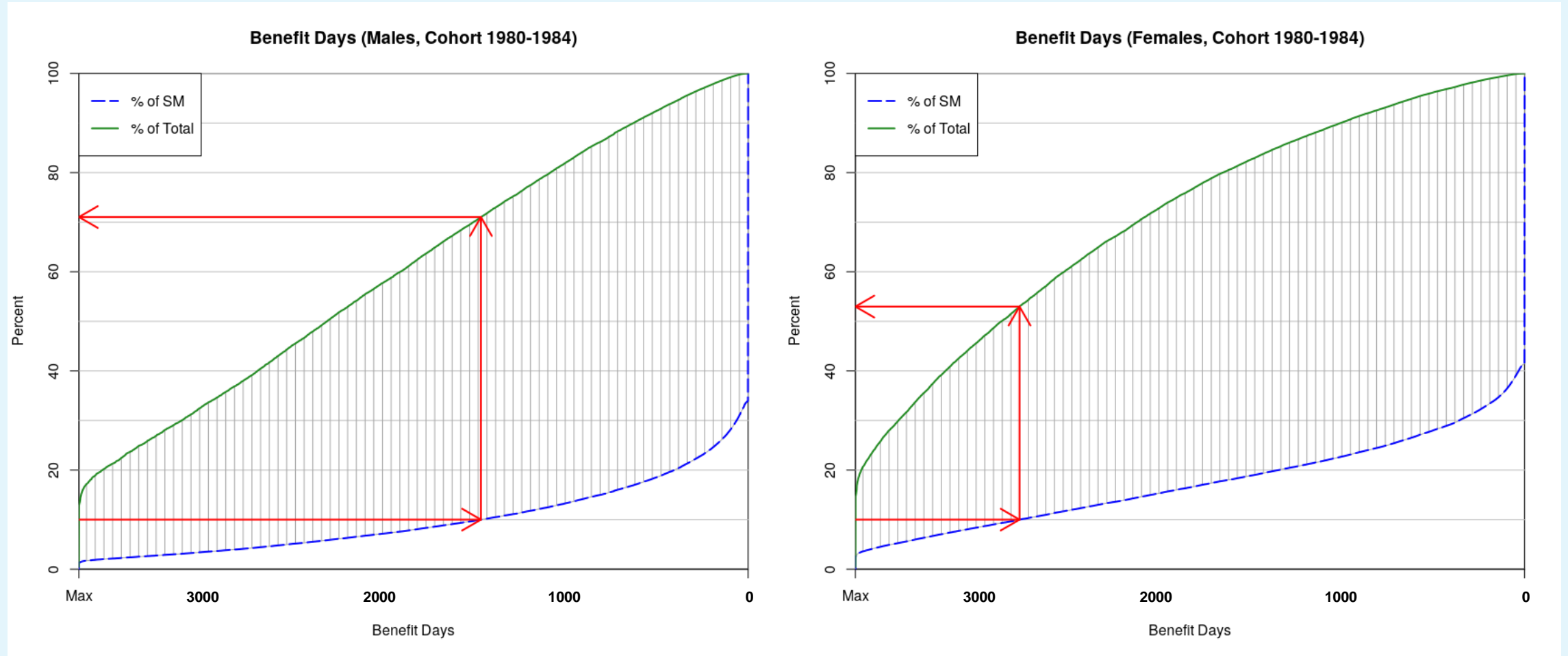
Hospital-Bed Nights (Males, Cohort 1980-1984)



Hospital-Bed Nights, adjusted for birth events (Females, Cohort 1980-1984)



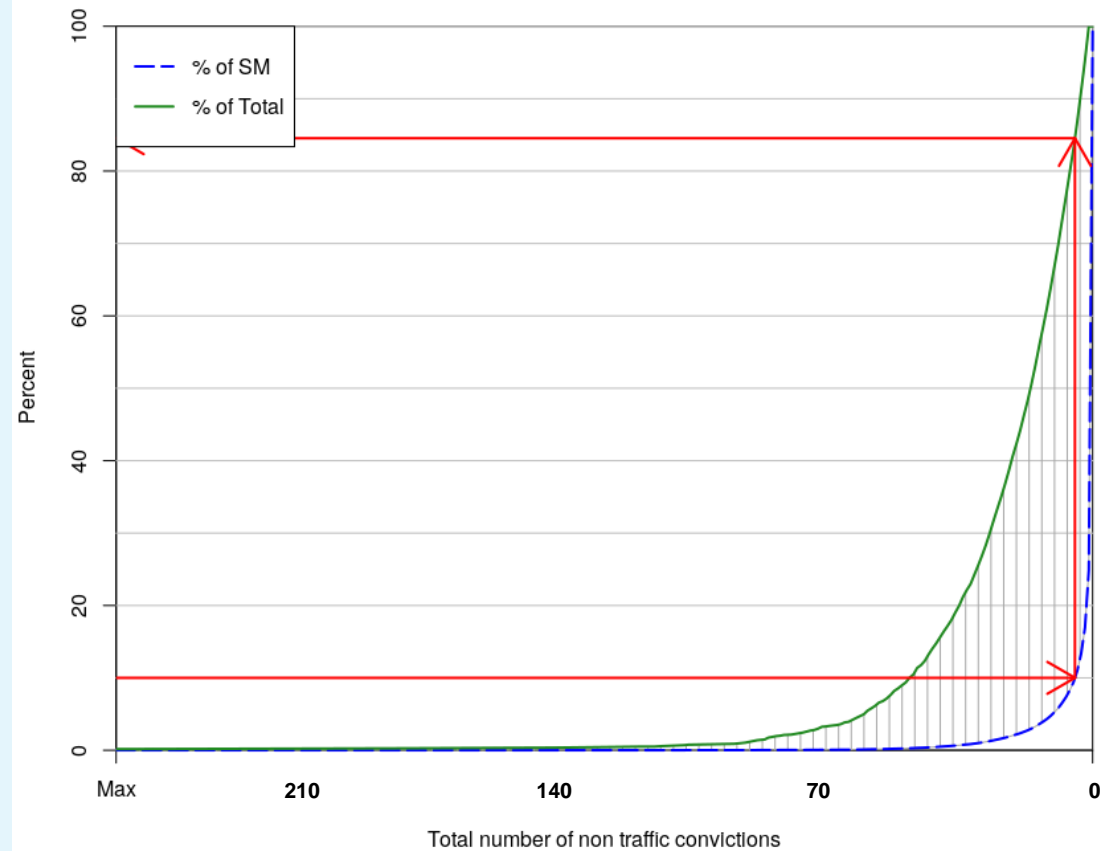
Benefit receipt (total number of days on benefit)



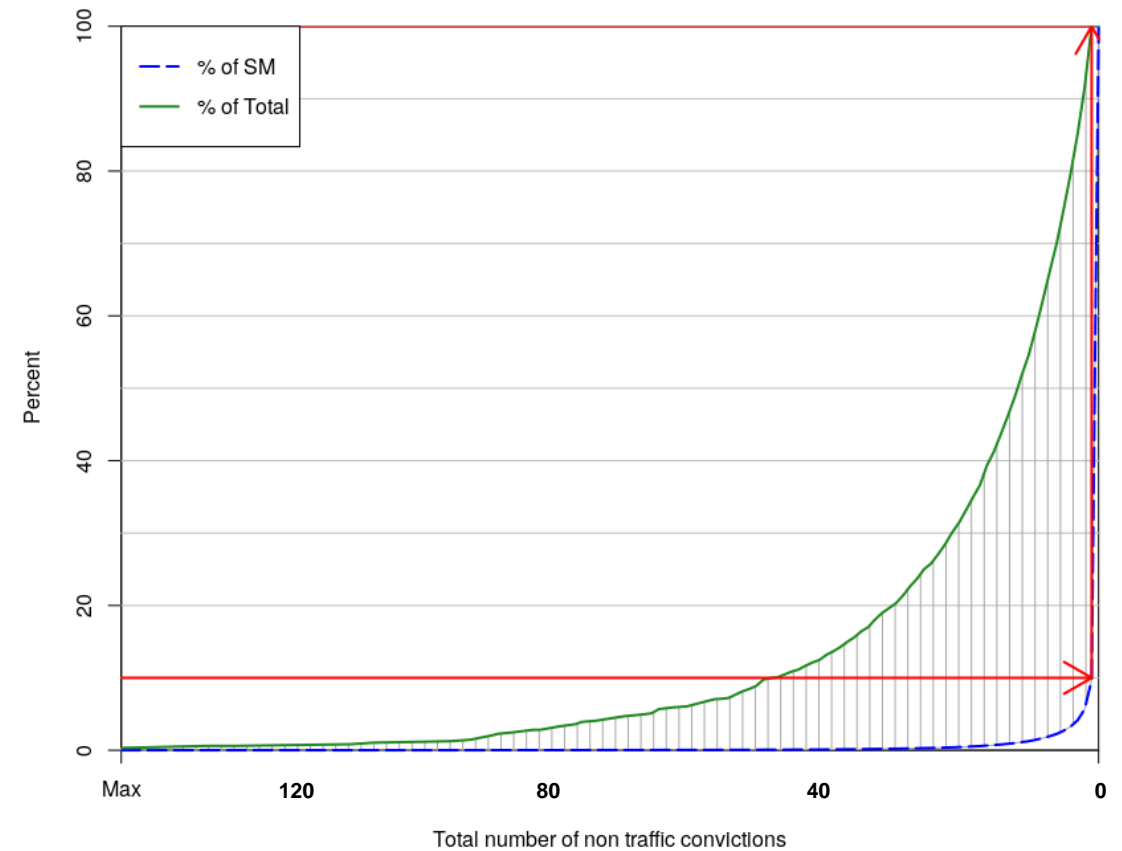
Convictions (total number)



Total number of non traffic convictions (Males, Cohort 1980-1984)



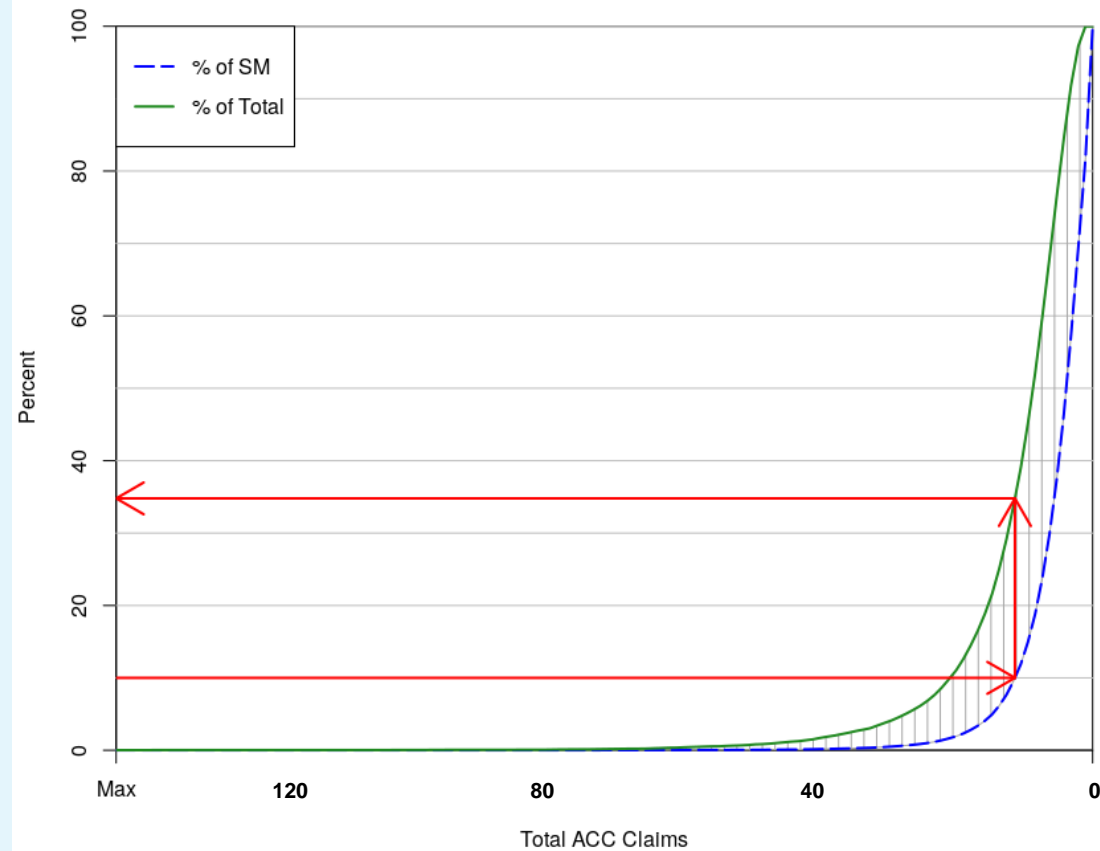
Total number of non traffic convictions (Females, Cohort 1980-1984)



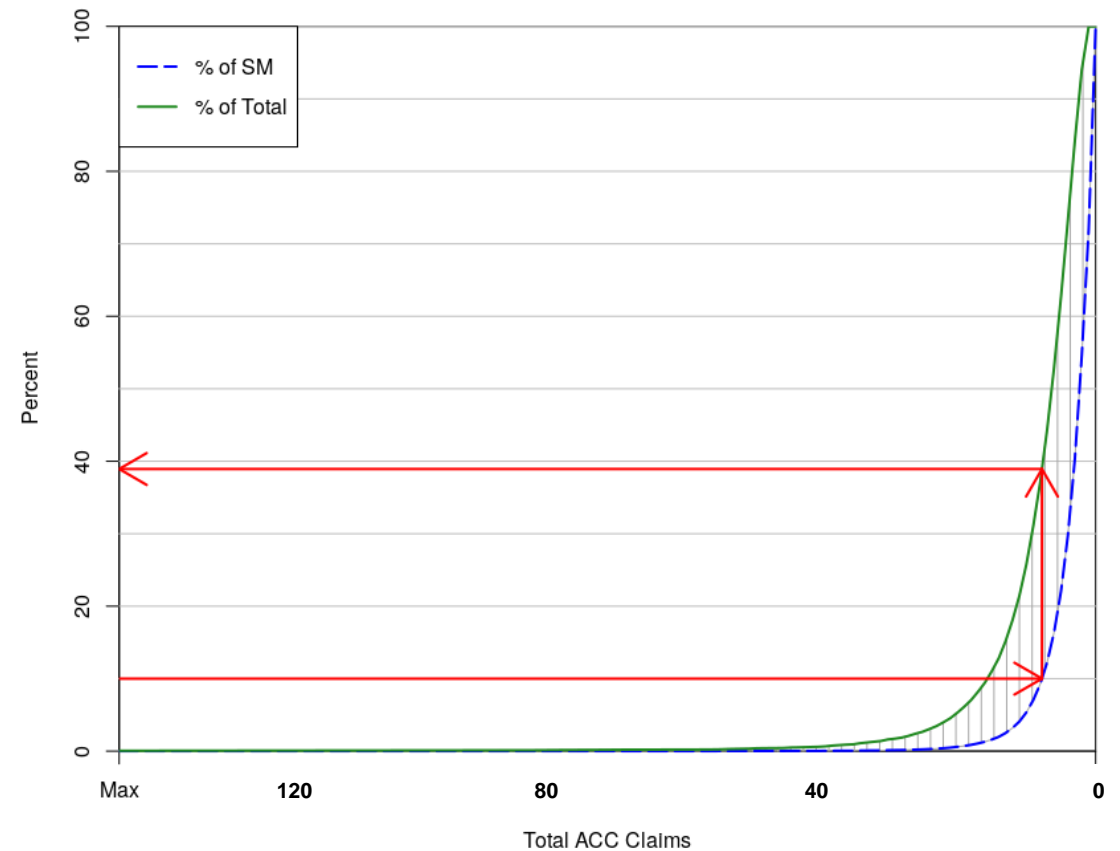
Accident Claims (total ACC claims)



Total ACC Claims (Males, Cohort 1980-1984)



Total ACC Claims (Females, Cohort 1980-1984)

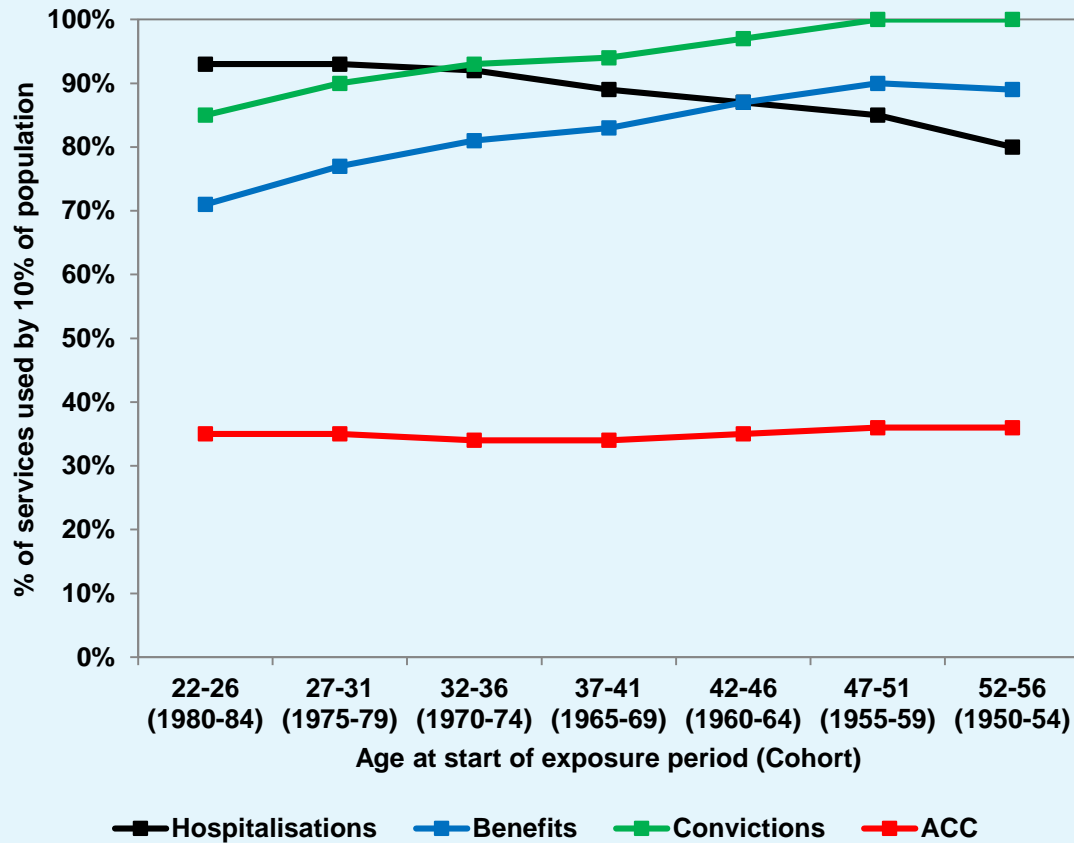


Concentration across sectors, cohorts and gender: 10% of users

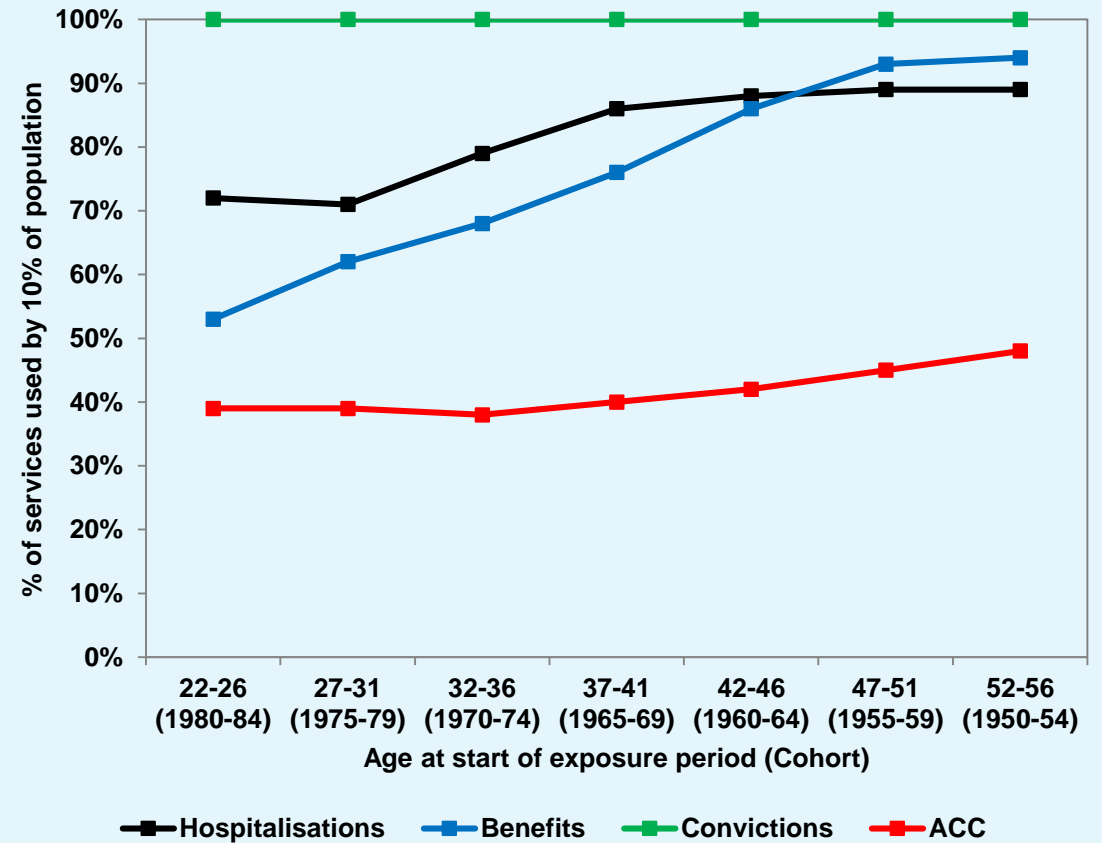
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Men

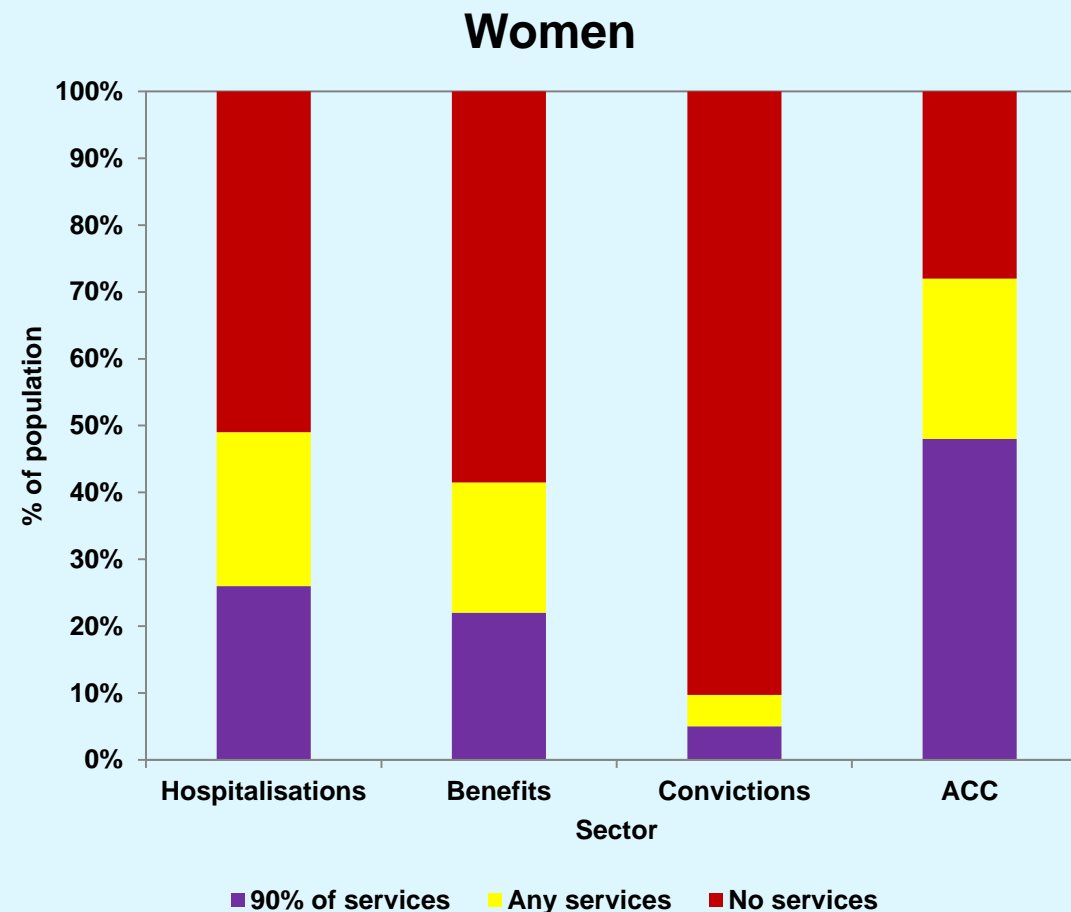
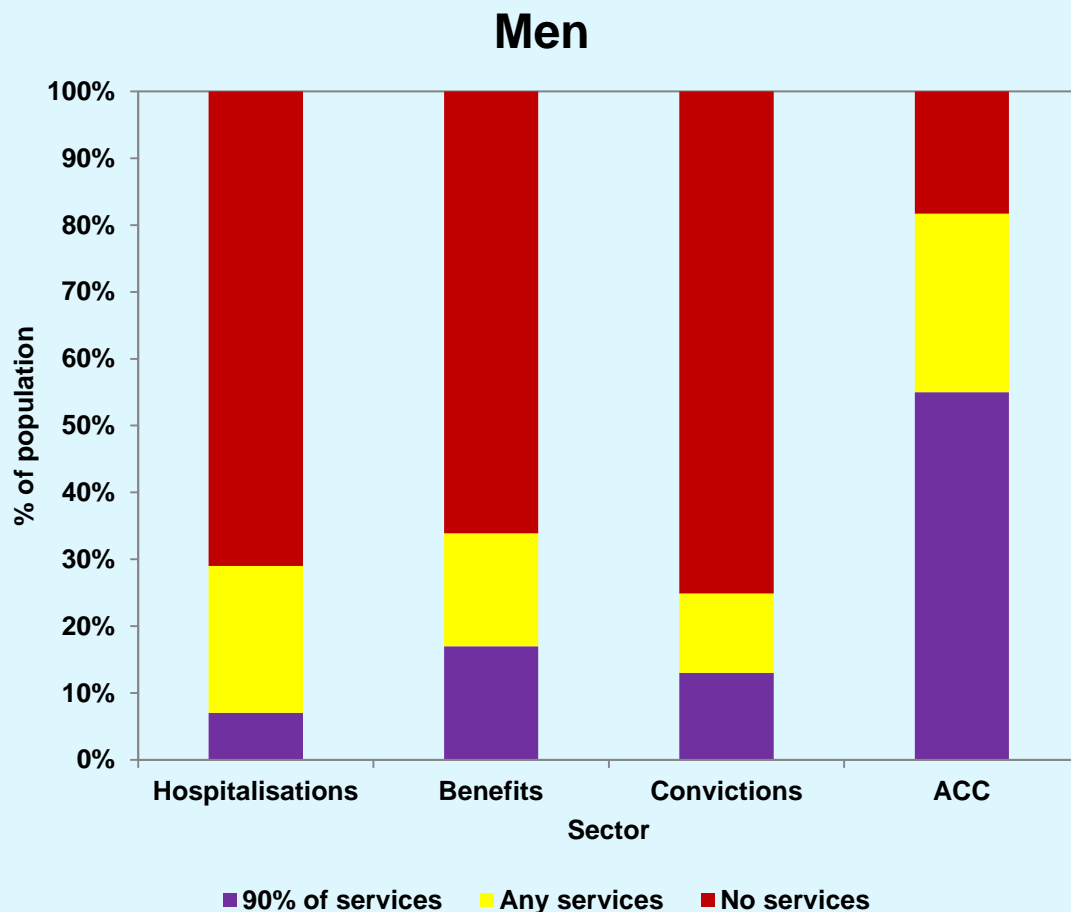


Women

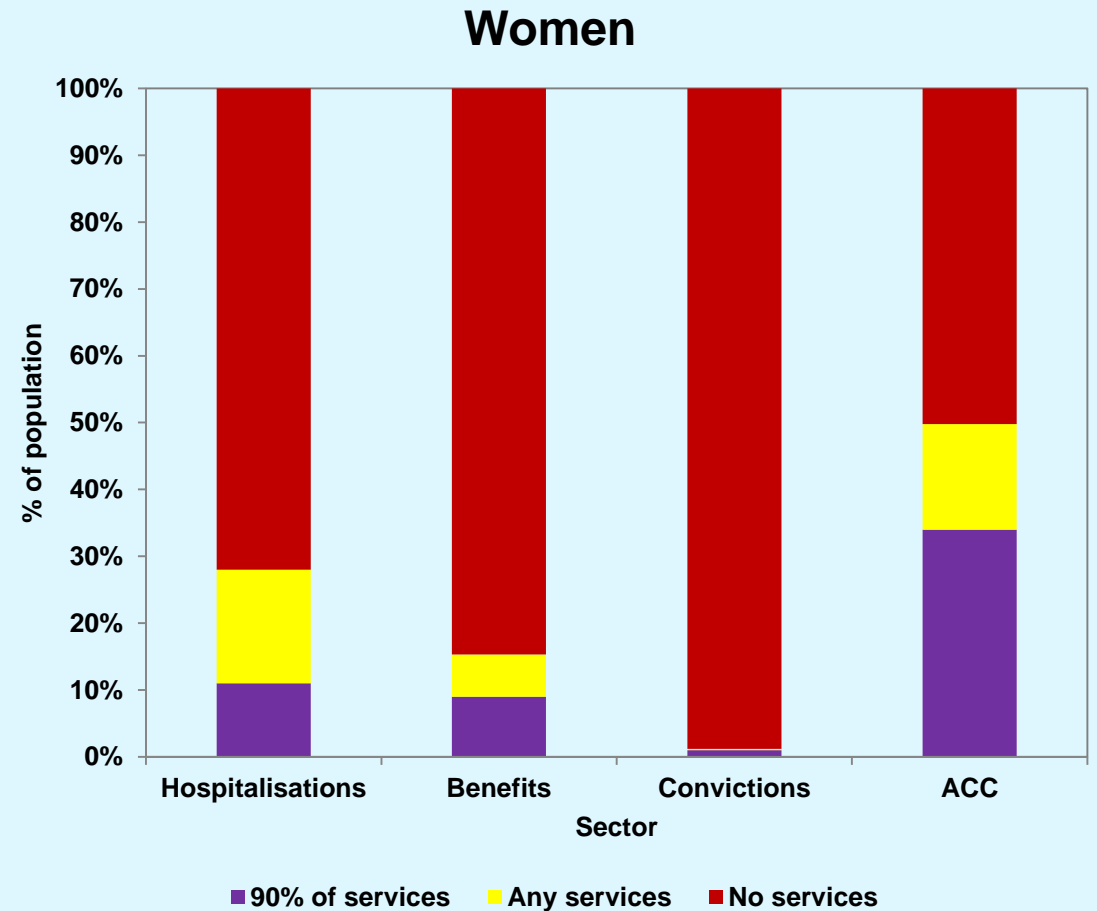
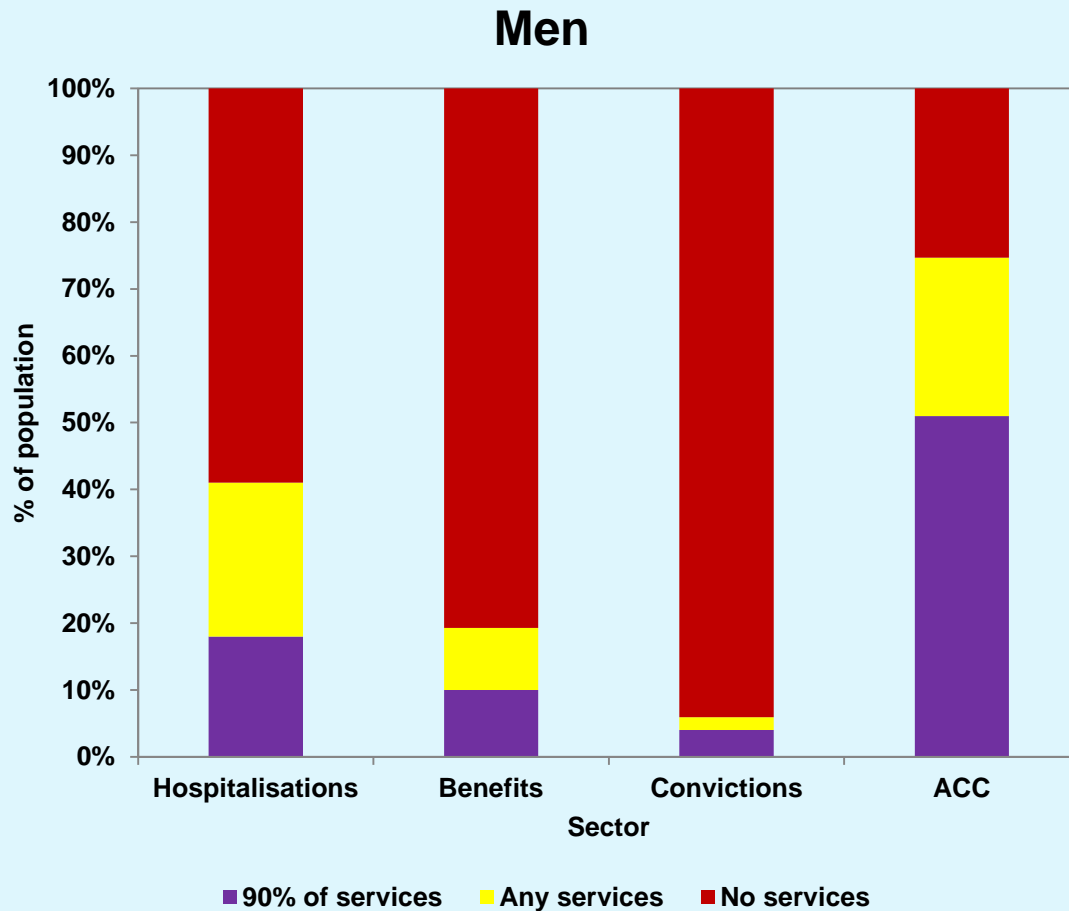


- ❑ In accounting for time spent in the country, we likely missed people who moved overseas before we could detect them
 - These would appear as service non-users in our analysis
 - (Back of envelope) calculations suggest that may be 0 – ~11.6% of ‘false non-users’ across cohorts
 - Taking out these ‘false non-users’ reduces concentration slightly, but trends remain the same.
 - Other sensitivity tests of this planned

Service use: Age 22–26 (Cohort 1980–84)



Service use: Age 52–56 (Cohort 1950–54)



Overlap 'top 10% of users'

	Men	Women
Hospitalisations-Benefit	OR ~ 5	OR ~ 3–6; <u>increasing</u> with age
Hospitalisations-Convictions	OR ~ 2–3; <u>decreasing</u> with age	OR ~ 2–3; <u>increasing</u> with age
Hospitalisations-ACC	OR ~ 2	OR ~ 2
Benefit-Convictions	Ages 22–36: OR ~ 10; Ages 37–56; OR ~ 6-7	OR ~ 10
Benefit-ACC	OR ~ 0.8	OR ~1–2; <u>increasing</u> with age
Convictions-ACC	OR ~1.1–1.3	OR ~1.2–2.2; <u>increasing</u> with age

- ❑ Pareto was right about concentration presence ... but extent varies
 - Very high for crime
 - High for hospitalisations and benefit receipt
 - Lower (but still substantial) for ACC

- ❑ Age, rather than cohort, effects
 - For women, concentration increased with age for all sectors
 - For men, concentration increased with age for all sectors for benefits and crime; decreased for hospitalisations; stable for ACC

- ❑ Strong overlap across sectors, especially hospitalisations, benefits and crime
 - Clearly unequal burden of service needs across the population
 - Argues for better co-ordination of services to support those who bear the brunt of this burden

- ❑ For men, UNDERLAP between benefits and ACC
 - Are men so well supported by ACC that they don't need benefit support??
 - ?Other thoughts?



QUESTIONS?

Concentration summaries



HOSPITALISATIONS	Males				Females			
	10% of age band =	20% of age band =	80% of bed nights =	90% of bed nights =	10% of age band =	20% of age band =	80% of bed nights =	90% of bed nights =
Age band								
1950–1954	80%	92%	10%	18%	89%	98%	6%	11%
1955–1959	85%	96%	8%	13%	89%	98%	6%	11%
1960–1964	87%	97%	7%	12%	88%	98%	7%	12%
1965–1969	89%	97%	5%	11%	86%	96%	8%	13%
1970–1974	92%	98%	4%	9%	79%	91%	11%	18%
1975–1979	93%	98%	3%	7%	71%	85%	16%	25%
1980–1984	93%	98%	3%	7%	72%	86%	15%	26%
	of bed nights	of bed nights	of age band	of age band	of bed nights	of bed nights	of age band	of age band

BENEFITS	Males				Females			
	10% of age band =	20% of age band =	80% of benefit days =	90% of benefit days =	10% of age band =	20% of age band =	80% of benefit days =	90% of benefit days =
Age band								
1950–1954	89%	100%	8%	10%	94%	100%	7%	9%
1955–1959	90%	100%	8%	10%	93%	100%	7%	9%
1960–1964	87%	100%	8%	11%	86%	100%	18%	11%
1965–1969	83%	99%	9%	12%	76%	98%	11%	13%
1970–1974	81%	98%	10%	13%	68%	97%	13%	17%
1975–1979	77%	97%	11%	14%	62%	92%	15%	19%
1980–1984	71%	95%	13%	17%	53%	86%	18%	22%
	of benefit days	of benefit days	of age band	of age band	of benefit days	of benefit days	of age band	of age band

Concentration summaries



CONVICTIONS	Males				Females			
	10% of age band =	20% of age band =	80% of convictions =	90% of convictions =	10% of age band =	20% of age band =	80% of convictions =	90% of convictions =
Age band								
1950–1954	100%	100%	2%	4%	100%	100%	1%	1%
1955–1959	100%	100%	3%	6%	100%	100%	1%	2%
1960–1964	97%	100%	4%	7%	100%	100%	2%	3%
1965–1969	94%	100%	6%	8%	100%	100%	2%	3%
1970–1974	93%	100%	6%	9%	100%	100%	3%	4%
1975–1979	90%	100%	7%	10%	100%	100%	3%	4%
1980–1984	85%	97%	8%	13%	100%	100%	3%	5%
	of convictions	of convictions	of age band	of age band	of convictions	of convictions	of age band	of age band

ACC	Males				Females			
	10% of age band =	20% of age band =	80% of claims =	90% of claims =	10% of age band =	20% of age band =	80% of claims =	90% of claims =
Age band								
1950–1954	36%	56%	39%	51%	48%	71%	26%	34%
1955–1959	36%	56%	39%	51%	45%	68%	28%	37%
1960–1964	35%	55%	39%	52%	42%	65%	31%	41%
1965–1969	34%	54%	40%	52%	40%	61%	33%	45%
1970–1974	34%	54%	41%	53%	38%	59%	36%	48%
1975–1979	35%	55%	40%	53%	39%	60%	36%	48%
1980–1984	35%	54%	42%	55%	39%	59%	36%	48%
	of claims	of claims	of age band	of age band	of claims	of claims	of age band	of age band