Impact of aircraft noise on cardiovascular diseases – the Cologne-Bonn Airport Study

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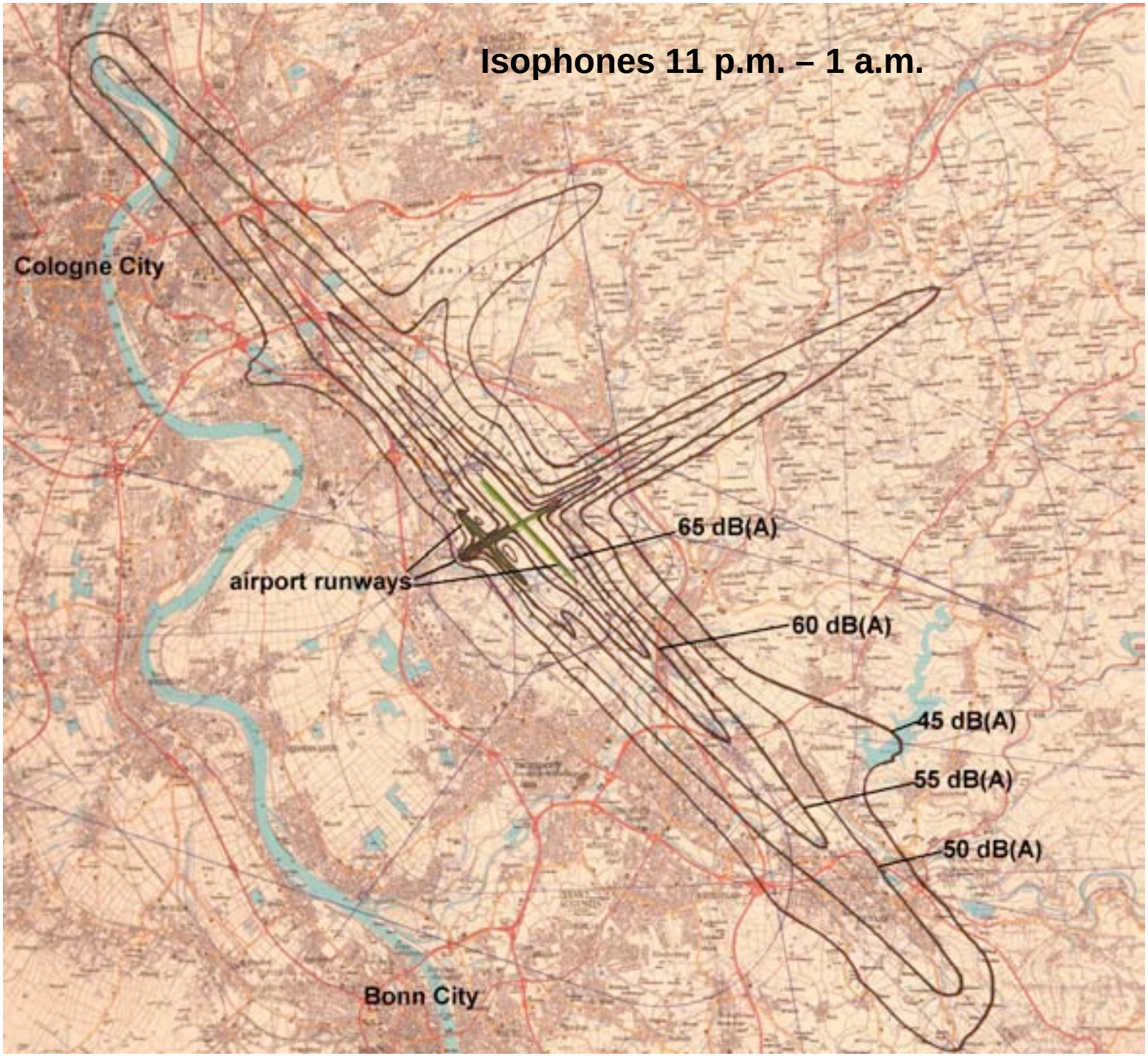
- **Stimulus:** Observations of a group of GPs in the vicinity of Cologne-Bonn Airport: More cases of hypertension, sleep disturbances, depression than to be expected.
- **Cologne-Bonn Airport:** Unlimited night-time air traffic, major hub for air cargo traffic (2004: 151.000 aircraft movements)
- **Design:** Case-control study with linkage of geo-references noise data and geo-references data of insurees of compulsory German sickness funds.
- **Noise data:** Aircraft noise (2004), road traffic noise & rail traffic noise (2000)
- **Sickness fund data:** 8 sickness funds providing data on out-patient drug prescriptions, hospital care discharge diagnoses
- **Area-specific data:** prevalence of social welfare recipients for city borroughs, density of nursing home beds/population aged 65+

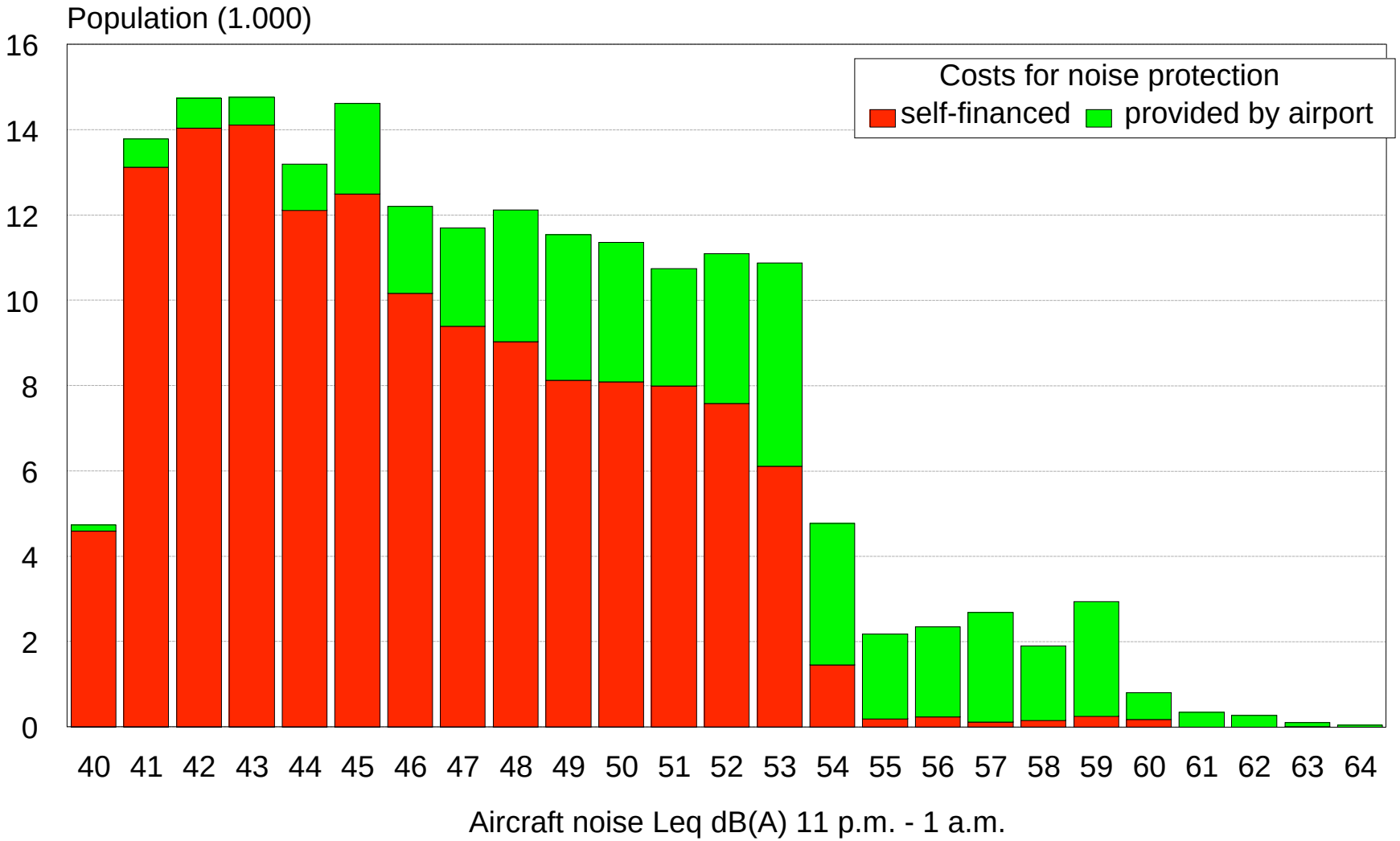
- **Funding:** Federal Office of Environment

Study region
total population: 1,93 Million

Study population 1,020,508
>>> 55.35%


Isophones 11 p.m. – 1 a.m.
Cologne City
65 dB(A)
airport runways
60 dB(A)
45 dB(A)
55 dB(A)
50 dB(A)
Bonn City

Study population exposed to night-time aircraft noise and financing of noise protection for bedrooms



Definition of incident cases

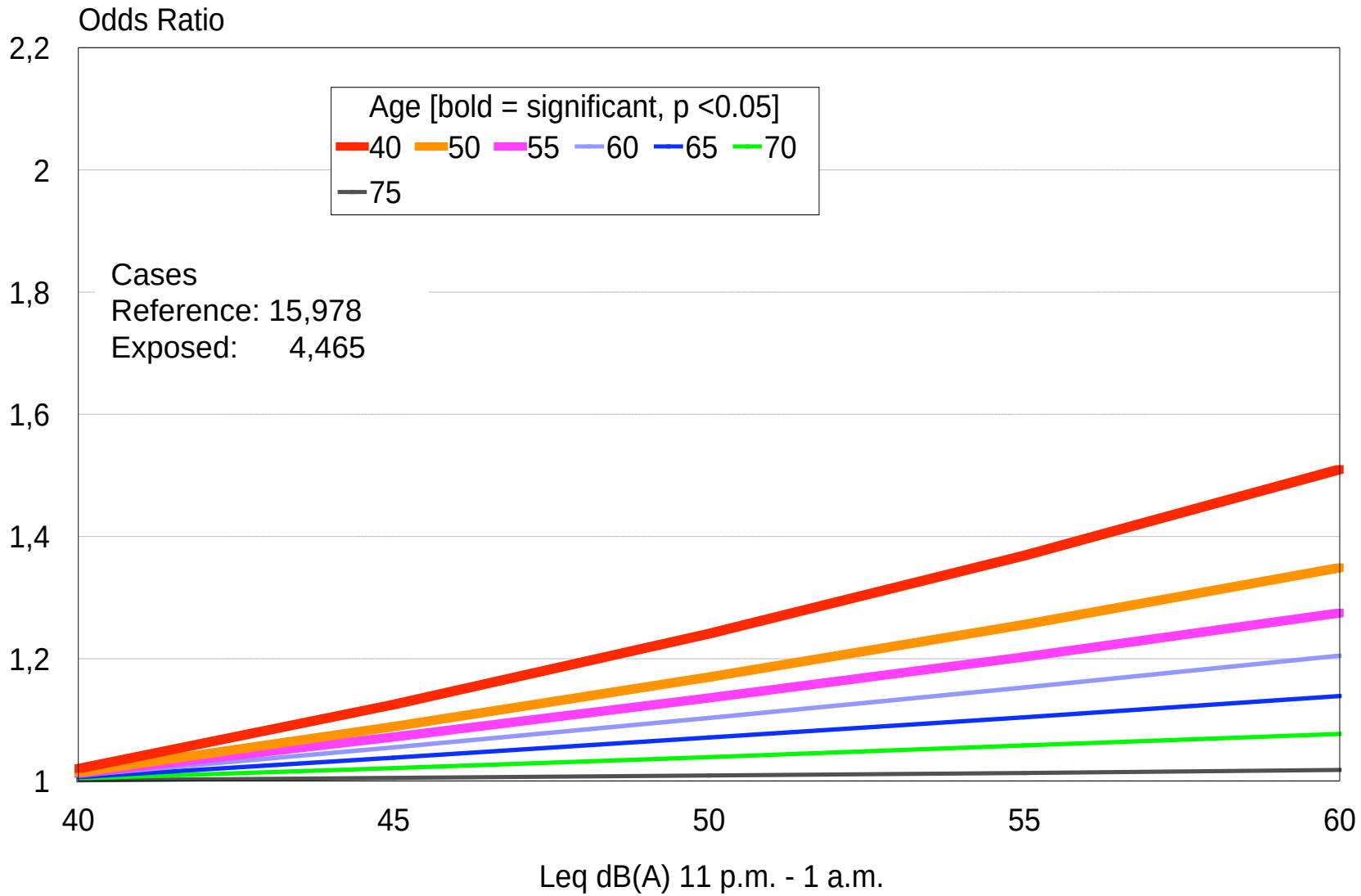
Hospital discharge diagnosis and
no prescription of any cardiac drug in first 6 months of first insurance phase.

Diagnostic entity	Gender	Cases	Controls
All cardiovascular diseases	M	20,443	166,638
	F	23,633	219,702
Acute MI	M	3,477	166,638
	F	2,581	219,702
Heart failure	M	7,951	166,638
	F	11,484	219,702
Coronary heart disease	M	14,085	166,638
	F	15,166	219,702
Stroke	M	3,816	166,638
	F	4,934	219,702

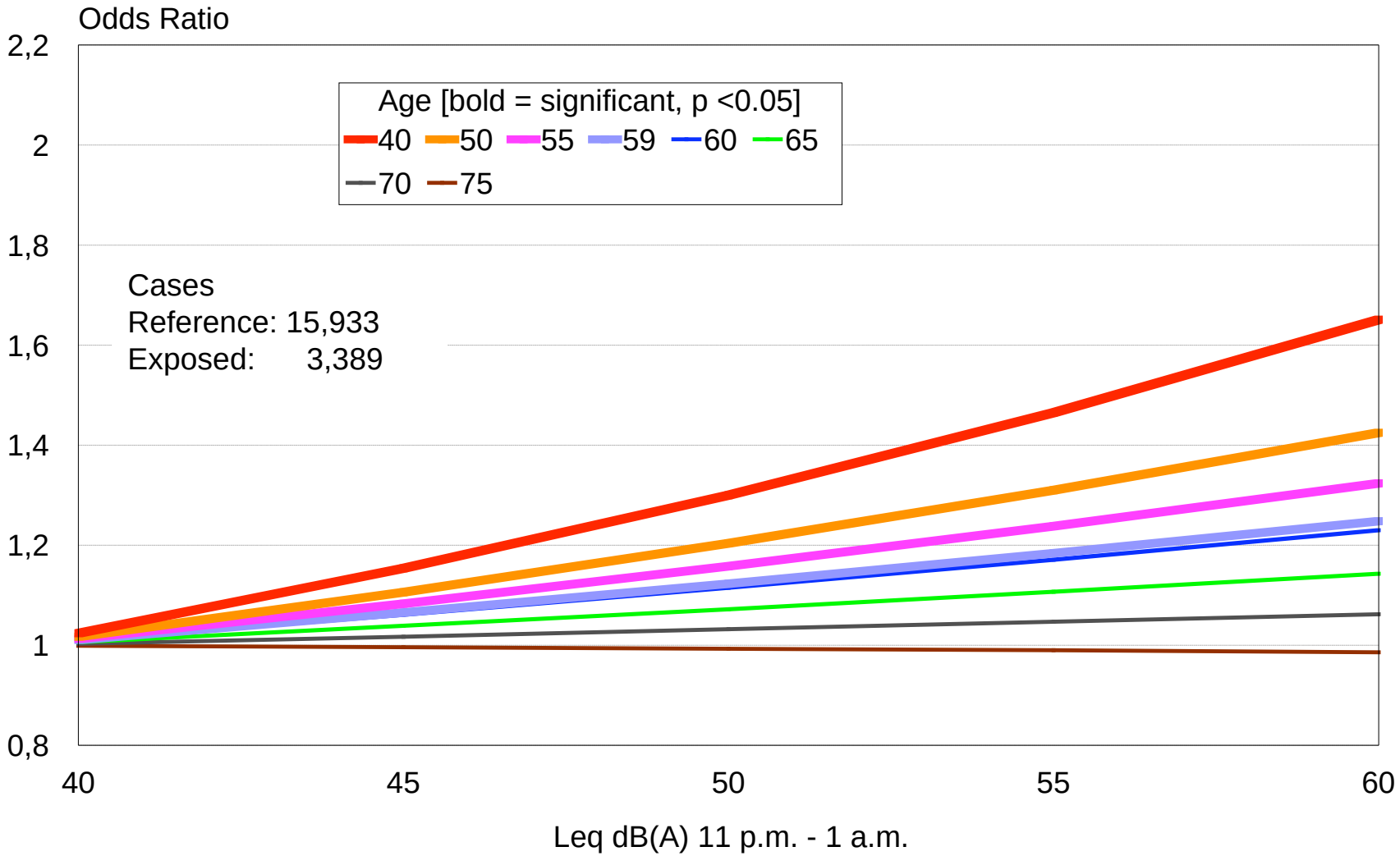
Unconditional logistic regression model

- Age
- equivalent dB(A)-corrected average noise levels:
  - aircraft 40 dB(A)+ (11 p.m.- 1 a.m.),
  - road 35 dB(A)+,
  - railroad 35 dB(A)+
- prevalence of social security recipients
- density of nursing home beds
- noise protection for bedrooms covered by airport
- interaction term (age*aircraft noise)
- drug-treated diabetes mellitus
- drug-treated hyperlipidemia
- standardization to 1987 census population structure

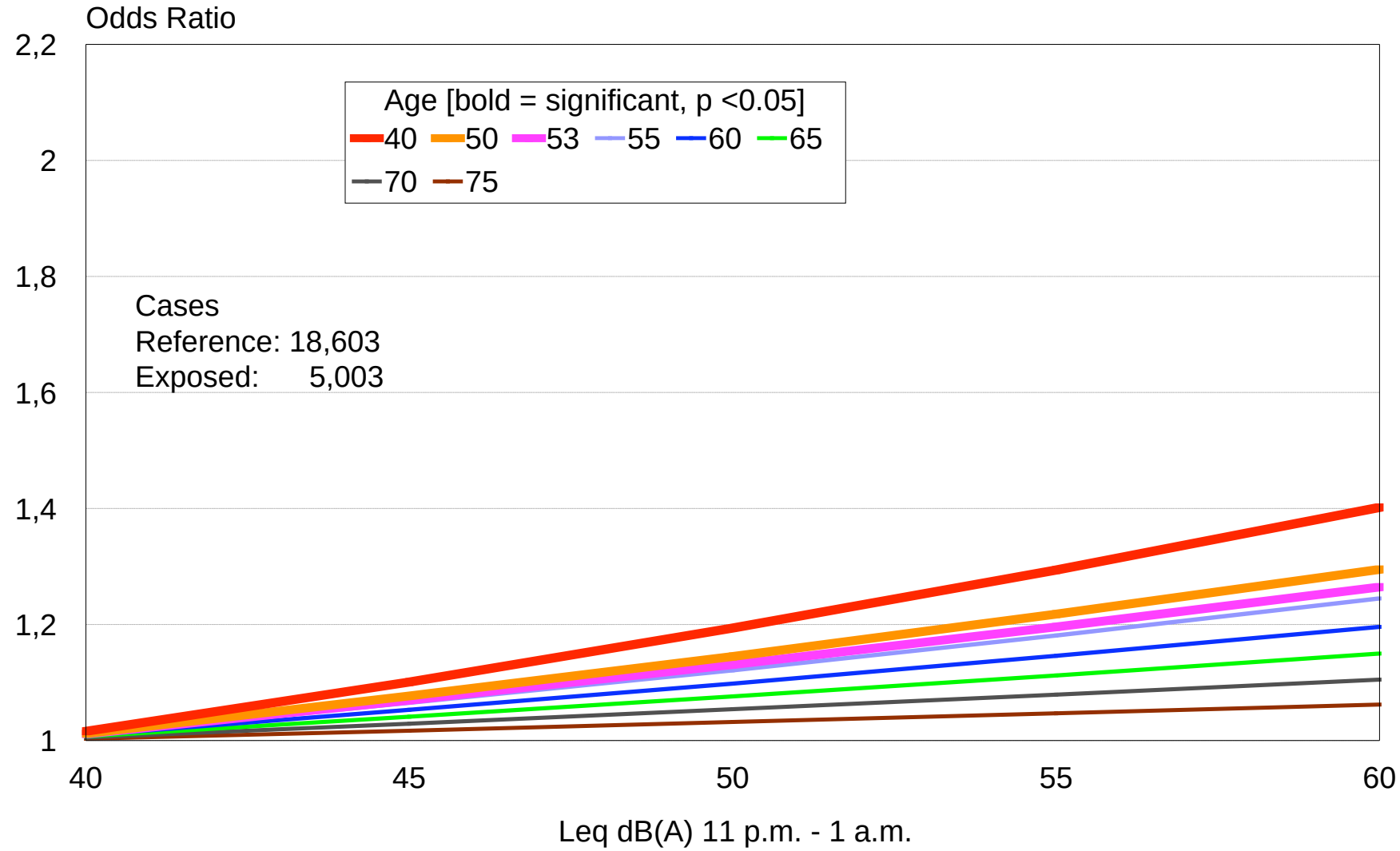
All cardiovascular diseases – men (40+) – total population



All cardiovascular diseases – men (40+) – no airport financing of noise protection



All cardiovascular diseases – women (40+) – total population



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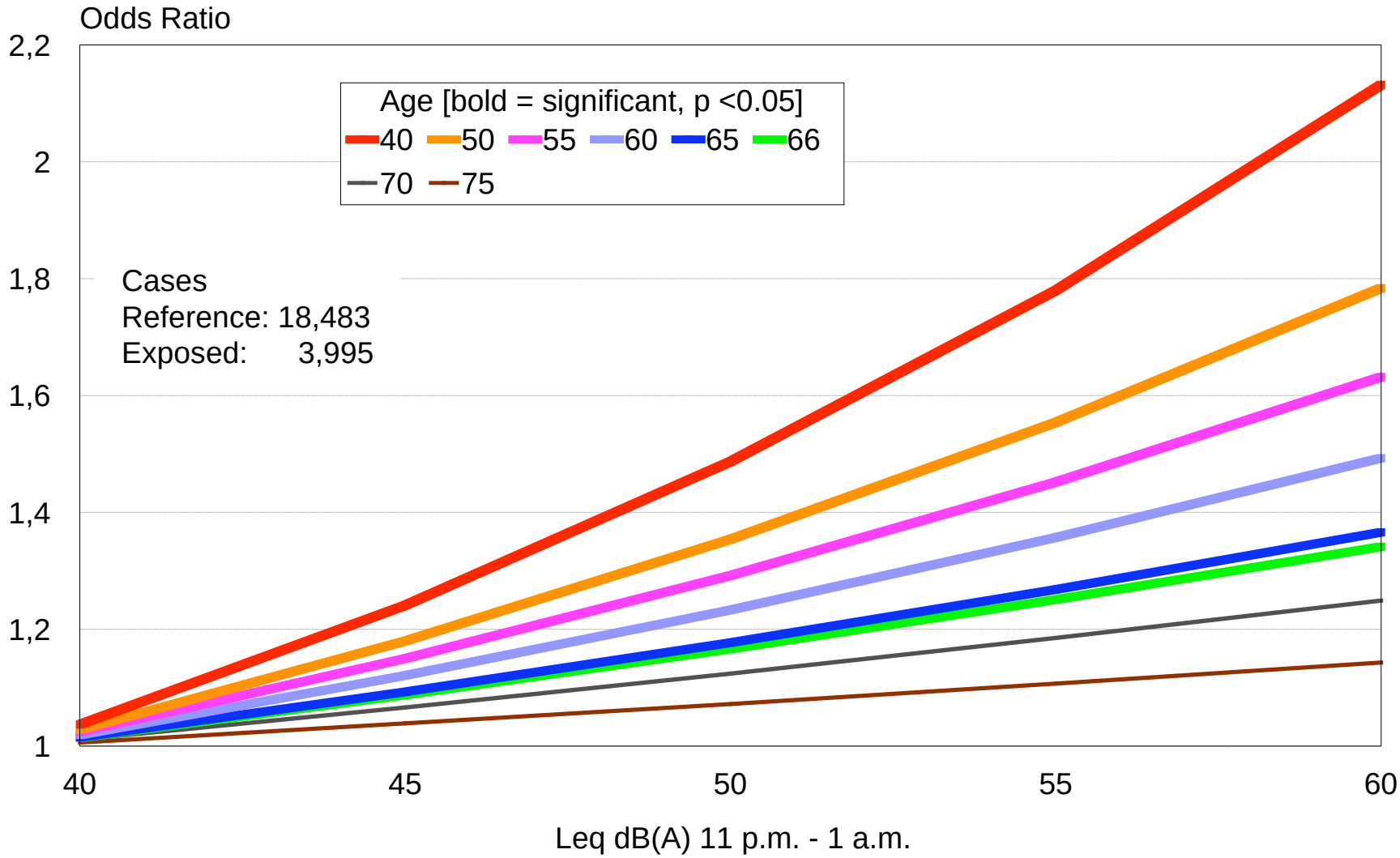
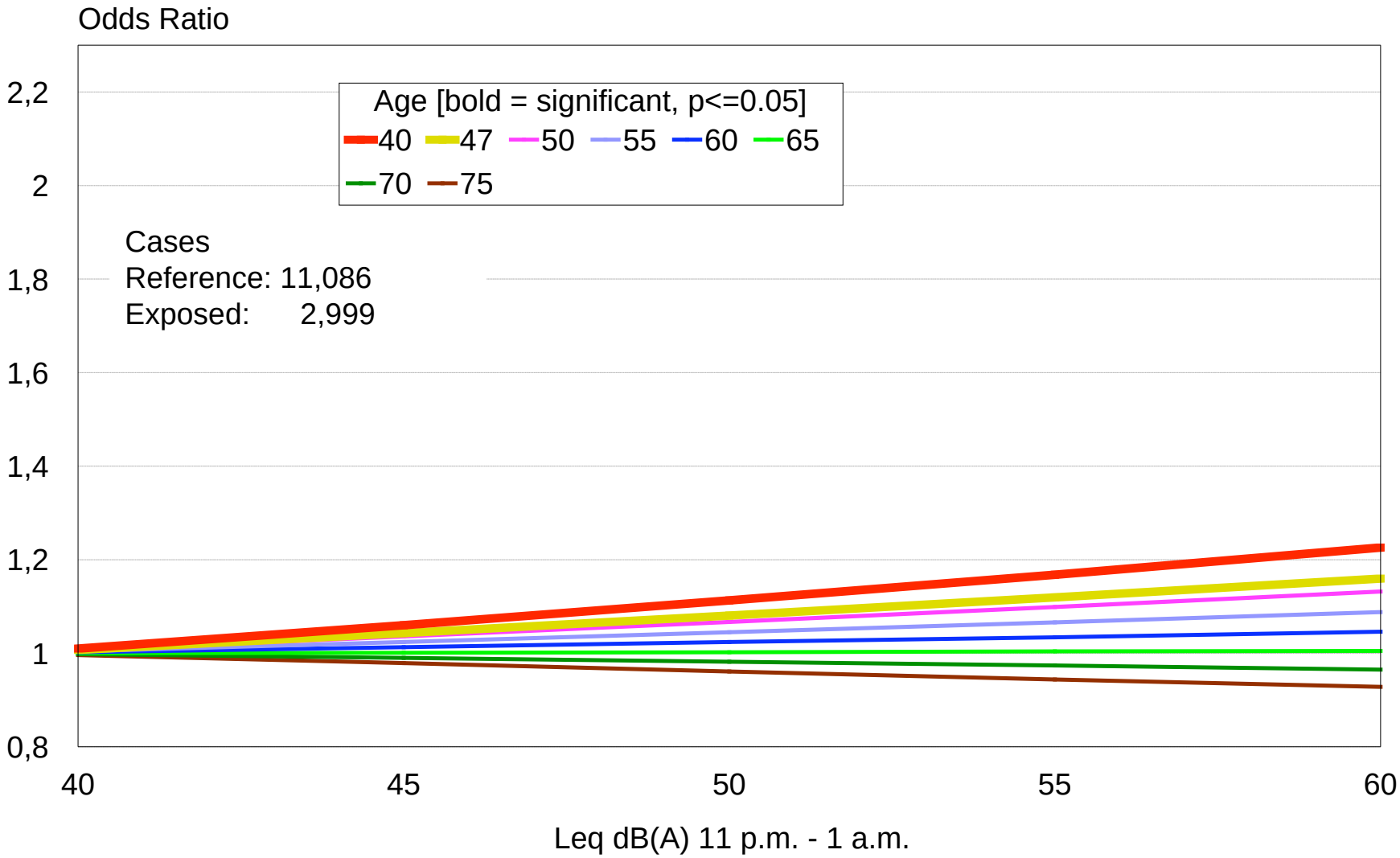


Coronary heart disease – men (40 +) – total population



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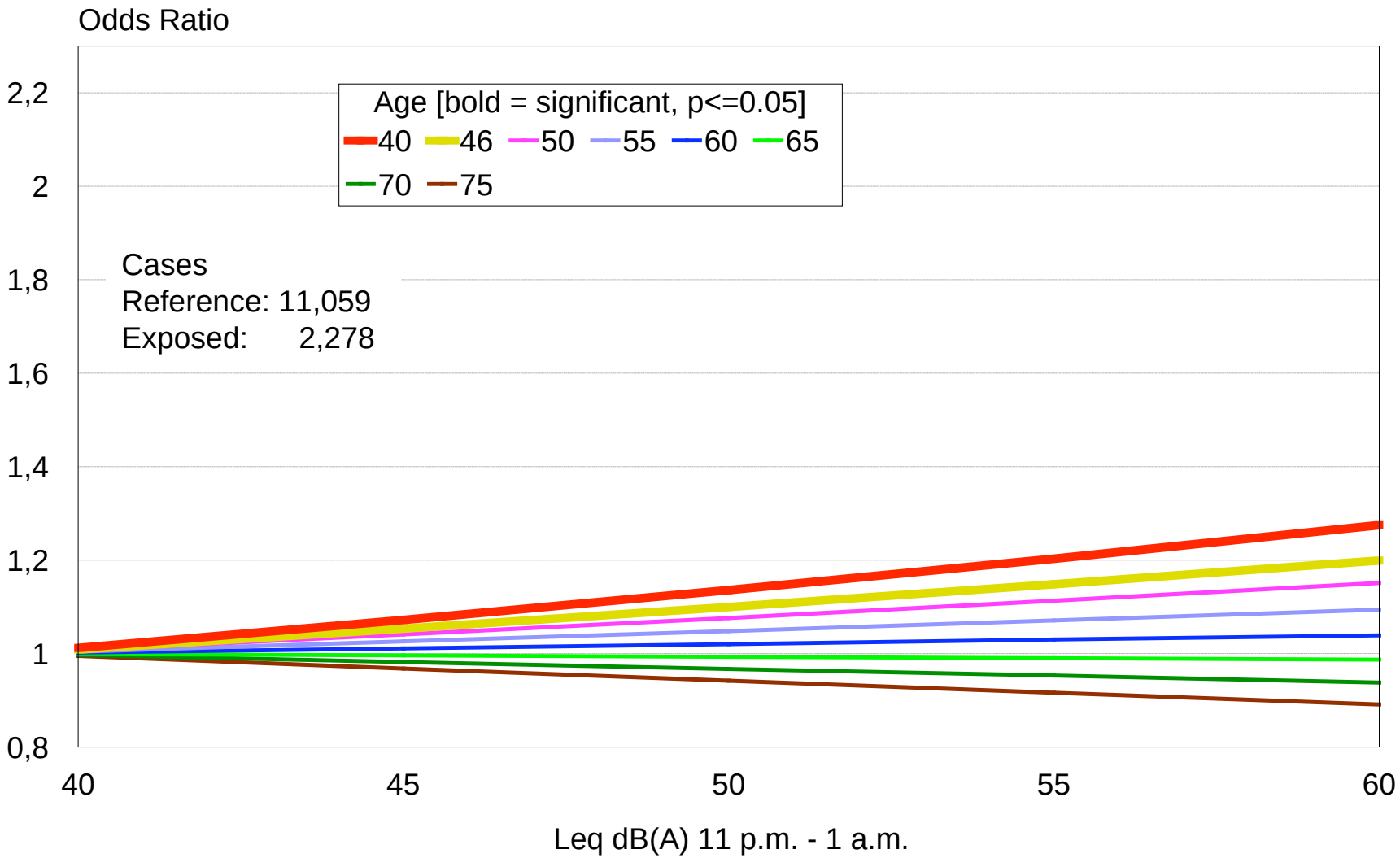

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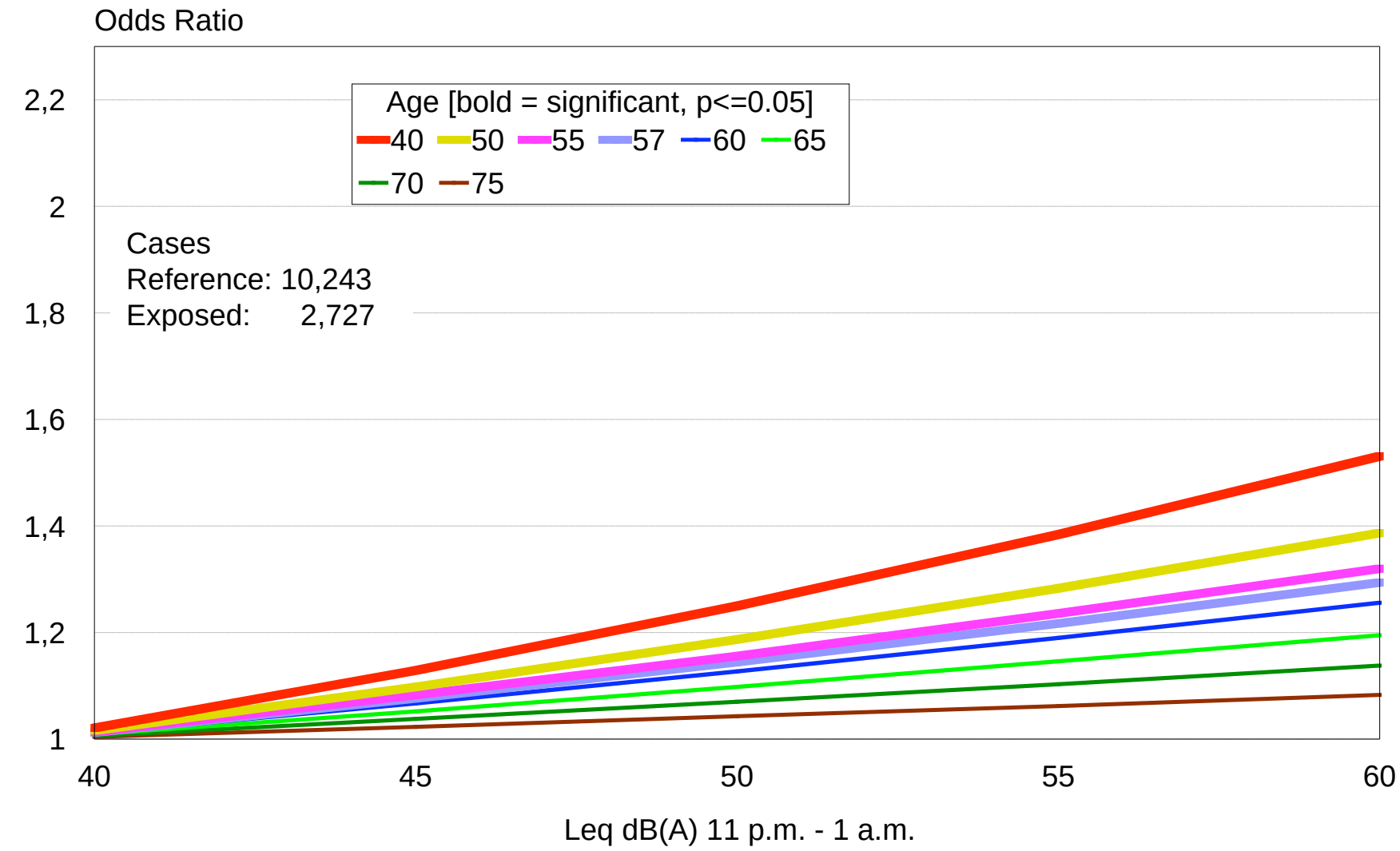

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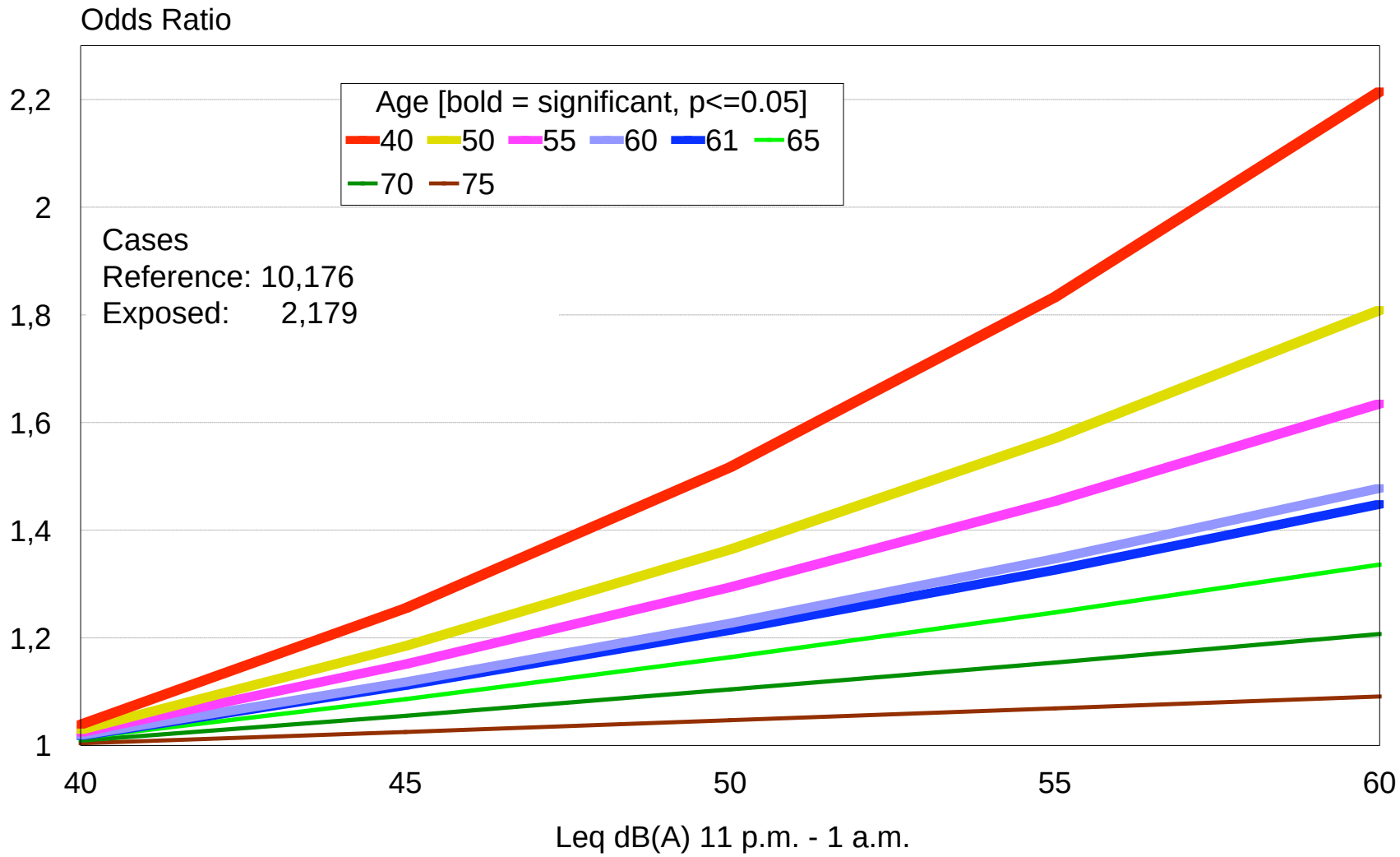
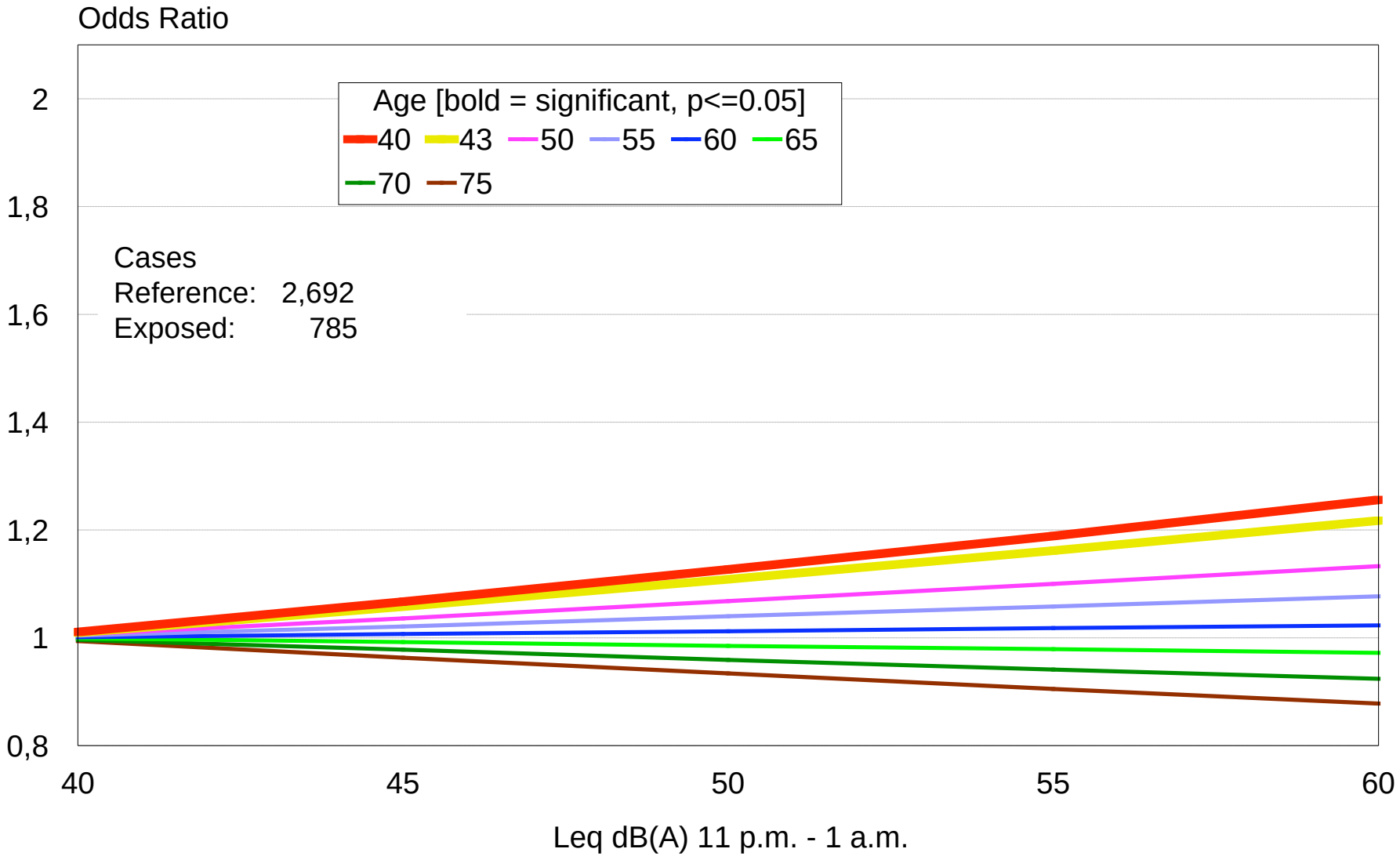


Acute myocardial infarction – men (40+) – total population



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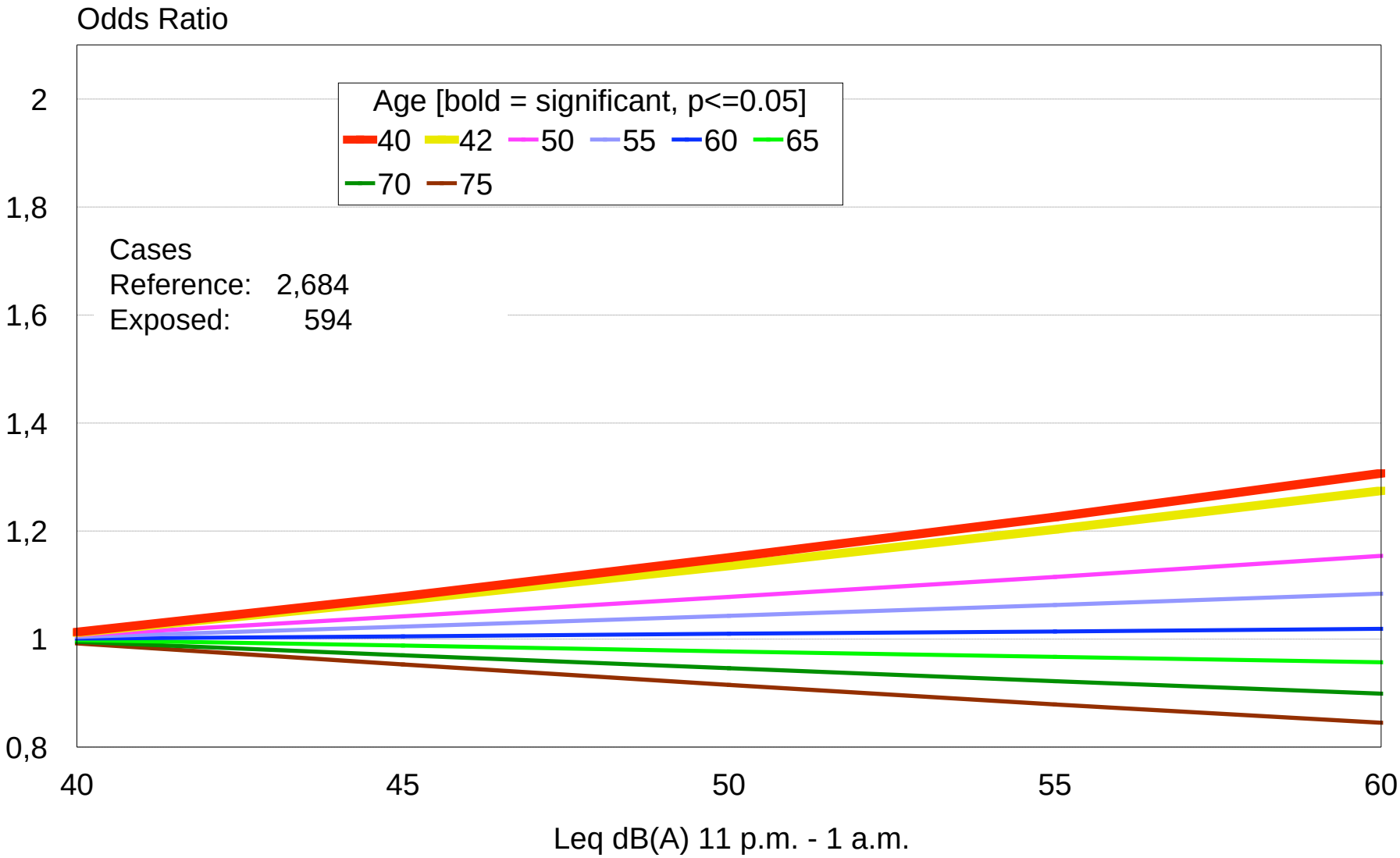

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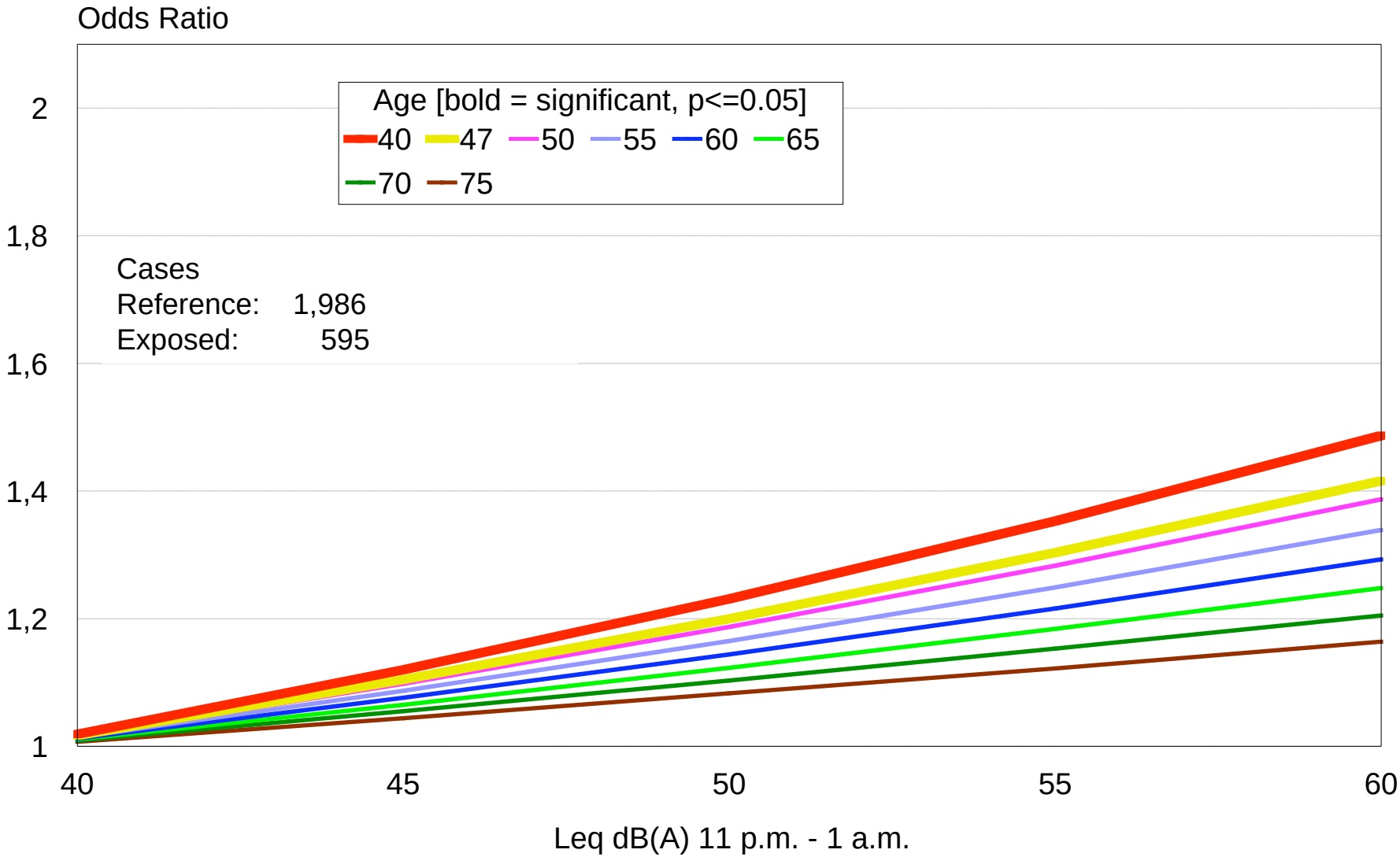

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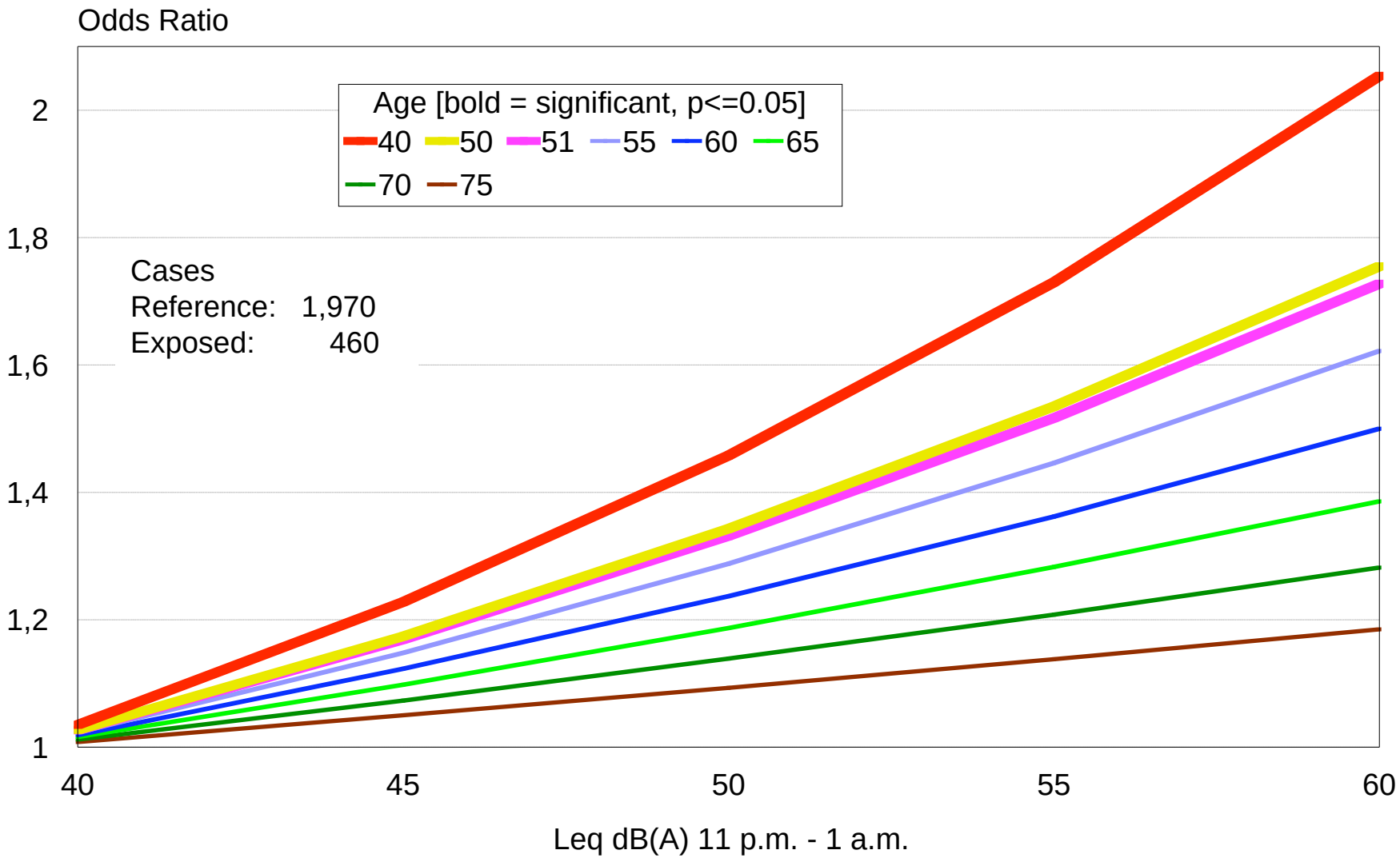
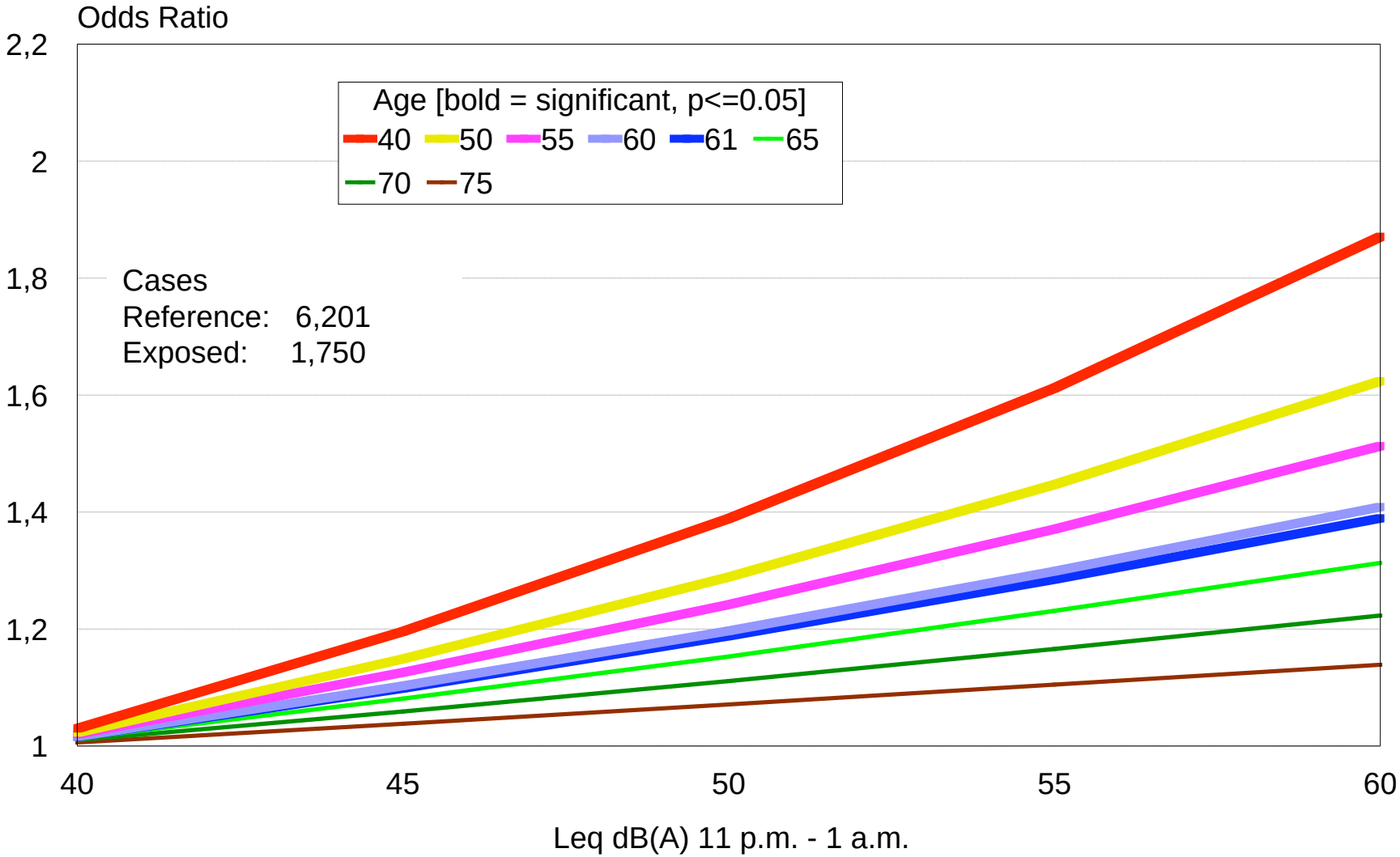
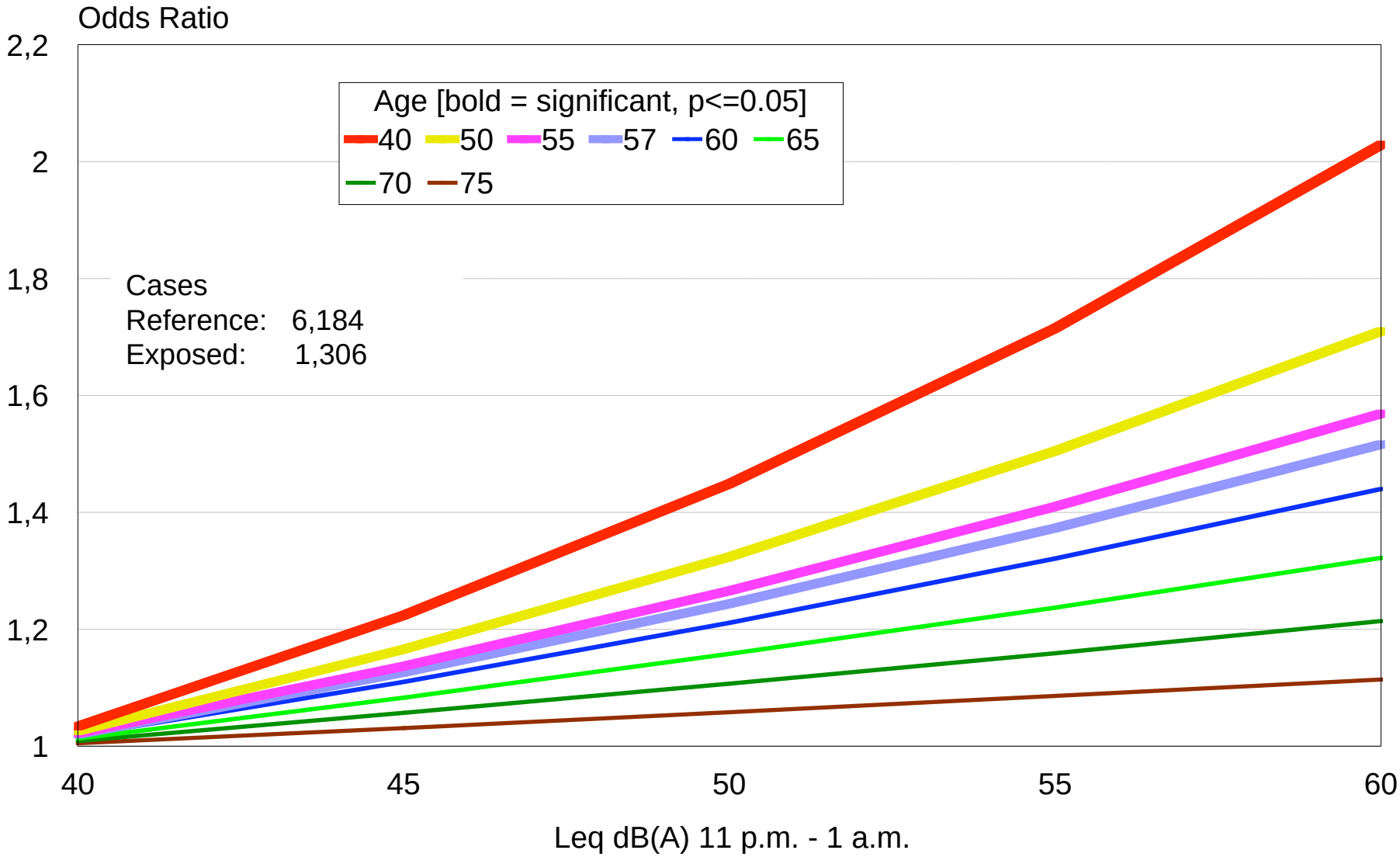
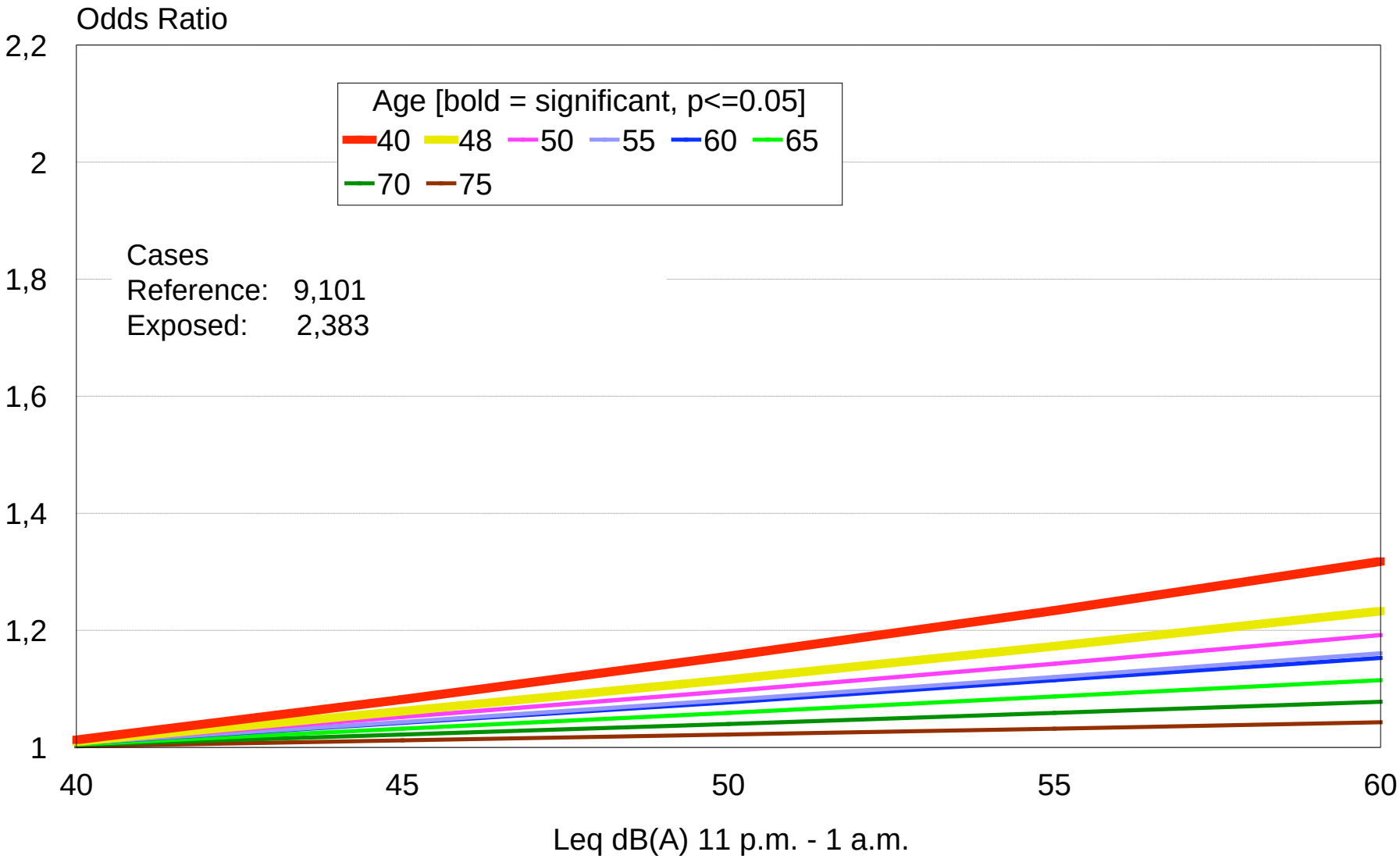


Heart failure – men (40+) – total population




Heart failure – men (40+) – no airport financing of noise protection
Odds Ratio
2,2
2
1,8
1,6
1,4
1,2
1
Age [bold = significant, p<=0.05]
40
50
55
57
60
65
70
75
Cases
Reference: 6,184
Exposed: 1,306
40
45
50
55
60
Leq dB(A) 11 p.m. - 1 a.m.

Heart failure – women (40+) – total population



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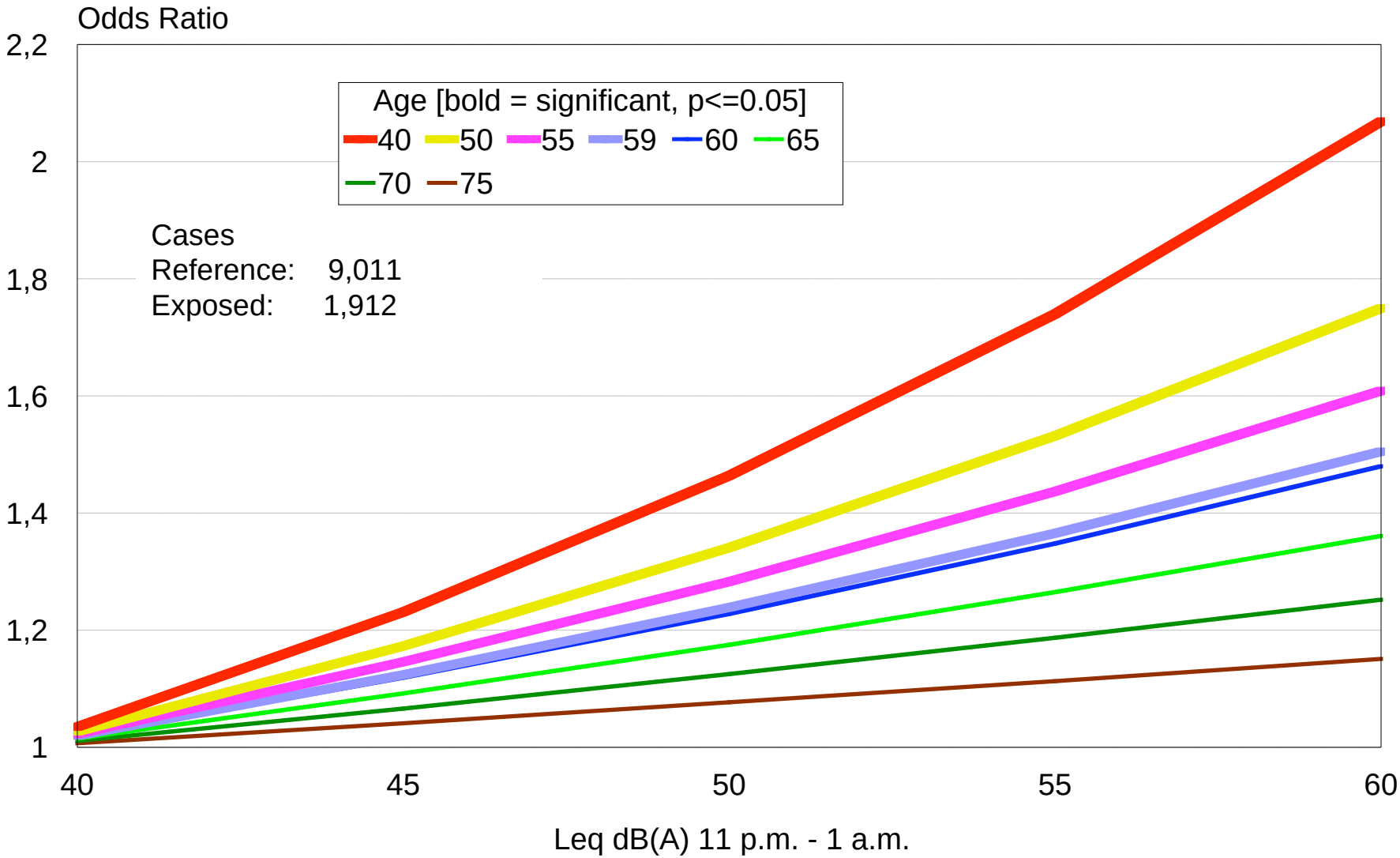

Limitations of the study

- Limited control of individual cardiovascular risk factors
- Area-specific social class indicator

Strength of the study

- Large data base
- No loss of information due to non-response

Conclusions

- There is a linear increase of disease risk with increasing night-time aircraft noise.
- Impact of night-time aircraft noise on cardiovascular diseases is decreasing with increasing age.
- There are larger effects in women than in men.
- In general effects are larger in persons without airport financing of noise protection, indicating a preventive effect of noise protection.
- Results are compatible with results of recent studies.