Fluctuating prevalence values of hearing impairment in 18-year-old Swedish men during four decades

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What is happening to hearing over time?

Is hearing constant?

Is hearing deteriorating?

Is hearing improving?
The pessimistic view

Hearing problems are increasing globally

WHO 2002 - 2030

DALYs (Disability-Adjusted Life Years)

Adult onset hearing loss: 2002 ranking # 13 globally
Year 2030 estimated ranking # 9 (2.5 DALYs)
High-income countries # 7 (4.1 DALYs)
Middle-income countries # 9 (2.9 DALYs)
Low-income countries < #10

Mathers & Loncar, 2006
The pessimistic view

In the Alameda County Study prevalence rates of self-reported trouble with hearing nearly doubled from 1965 to 1994

Wallhagen et al, 1997

Increases in prevalence of hearing loss in adolescents from 15% to 19.5% from 1988–1994 to 2005–2006

NHANES Shargorodsky et al, 2010

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The optimistic view

Prevention

NIHL – prevention

Vaccination programmes

ARHL – life-style factors

"Americans hear as well or better today compared with 40 years ago"

NHANES, NHES  Hoffman et al, 2010

Persons from later birth cohorts had lower prevalences of hearing impairment than those from earlier birth cohorts

Beaver Dam Study, EHLS  Zhan et al, 2010
The optimistic view

75-year olds over three decades: No audiometric changes
The Gerontological and Geriatric Population Study in Gothenburg, Sweden   Rosenhall et al, 2013
Differences between age-cohorts can be explained by Cohort and Period Effects
The Swedish Armed Forces have relied on a conscript system where all young men, liable for compulsory military service, constituted the fundament - recently also voluntary for women.

The conscript system was introduced in 1811.

The conscript system ended in 2010 after almost 200 years.
All servicemen who were drafted underwent medical examinations, including screening audiometry at:

1) Conscription at age 18 years
2) Reporting to service at 18 – 22 years of age
3) Discharge after 260 days of military service
4) Any occasion during military service, if indicated

All medical data were filed and are available to research after ethical approval
Available conscripts

18-year old men

24 age cohorts 1971 – 2010

N: 881 626

1981: 54 325 (92.2%)

2010: 6 793 (10.1%)
Response rates

Percent of Age Groups

1971 – 1999
80% - 95%

2000 – 2004
52% - 65%

2005 – 2010
10% - 46%
Estimation of representativity

Inclusion of the years 1971 to 2004

N: 781 564
Response rates from 52% (2004) to 95% (1996)

Height
Weight
Prevalence of asthma

Samples from the years 2000 – 2004 are representative of the general population
Hearing loss prevalence 0.5 – 6 kHz, 1971 – 2004 (-2010), Left ear
Hearing loss prevalence 0.5 – 6 kHz, 1971 – 2004 (-2010), Right ear
Mild, moderate, and severe hearing loss in the high frequency region, 1971 – 2004 (-2010), one or both ears
Hearing loss prevalence 3 - 6 kHz, any ear 1971 – 2005
Summary and Conclusions

Slow fluctuations of hearing loss prevalence over many years

Decreasing prevalence in the 70ies and 80ies

Increasing prevalence in the early 90ies

Decreasing prevalence from 1996 to 2004
Summary and Conclusions

The fluctuations were most prominent for the frequency 6 kHz, but were also noticed for 3 and 4 kHz.

The fluctuations were only observed for mild hearing loss.

Moderate and severe hearing loss had decreasing prevalence values during the entire study period.