



Mobile phone exposures in children

Joachim Schüz

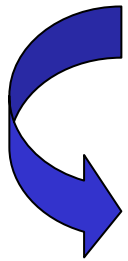
Institute of Medical Biostatistics,
Epidemiology and Informatics
(IMBEI)

University of Mainz, Germany

W2F: Mobile Youth 2004

Your guide to developing mobile products for and marketing to Youth. 180 page report covering 38 countries.
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„... the widespread use of mobile phones by children for non-essential calls should be discouraged. ...“

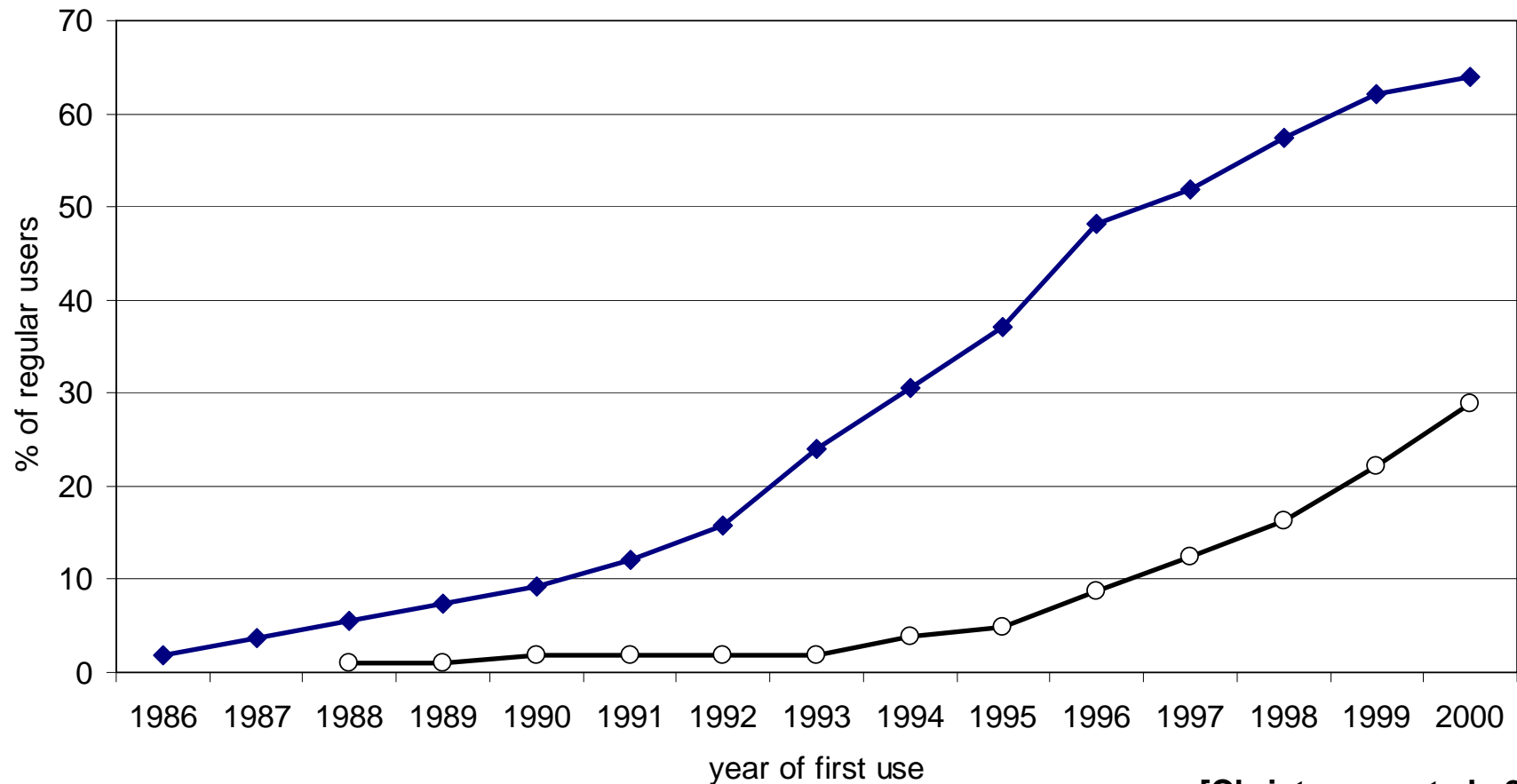


justification of the precautionary approach:

- the developing nervous system (more vulnerable?)
- the greater energy absorption in the head (higher exposure per call?)
- a longer lifetime exposure (higher cumulative exposure?)

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- ❶ Is there support for the assumption that today's children will have a higher cumulative exposure to radiowaves from mobile phones than today's adults when they are at their age ?
 - ❷ What are current patterns of use in children and are there typical characteristics of kids using mobile phones regularly ?
 - ❸ What types of exposure are related to mobile telecommunications that are relevant for children ?

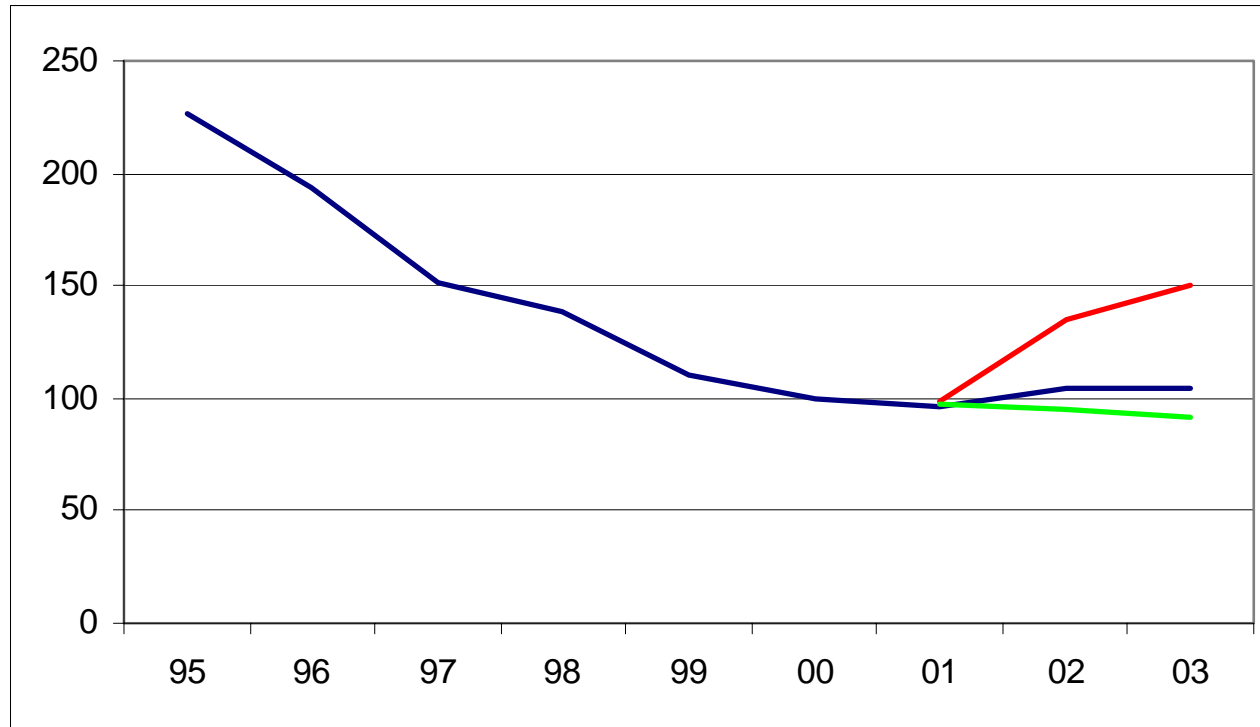
① Higher cumulative exposure ? *IMBEI*



[Christensen et al., 2004]

Proportion of regular MP users over time among middle-aged persons

① Higher cumulative exposure ? *IMBEI*



frequent user

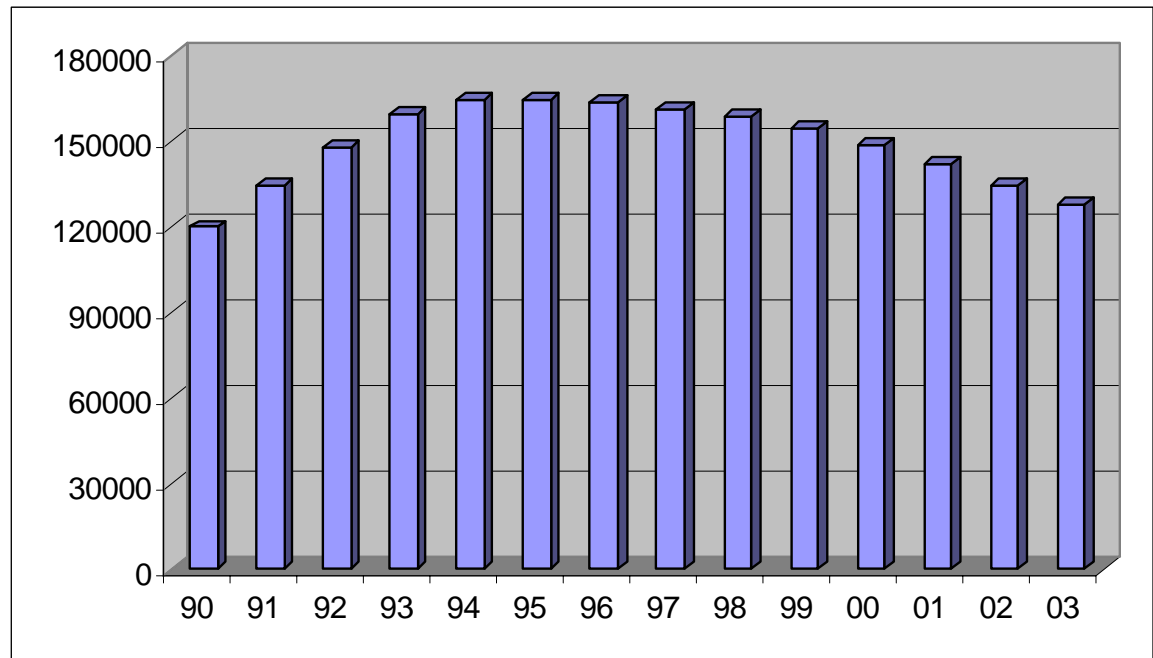
rare user

Costs associated with the use of a mobile phone over the years
(Germany, Year 2000 = 100)

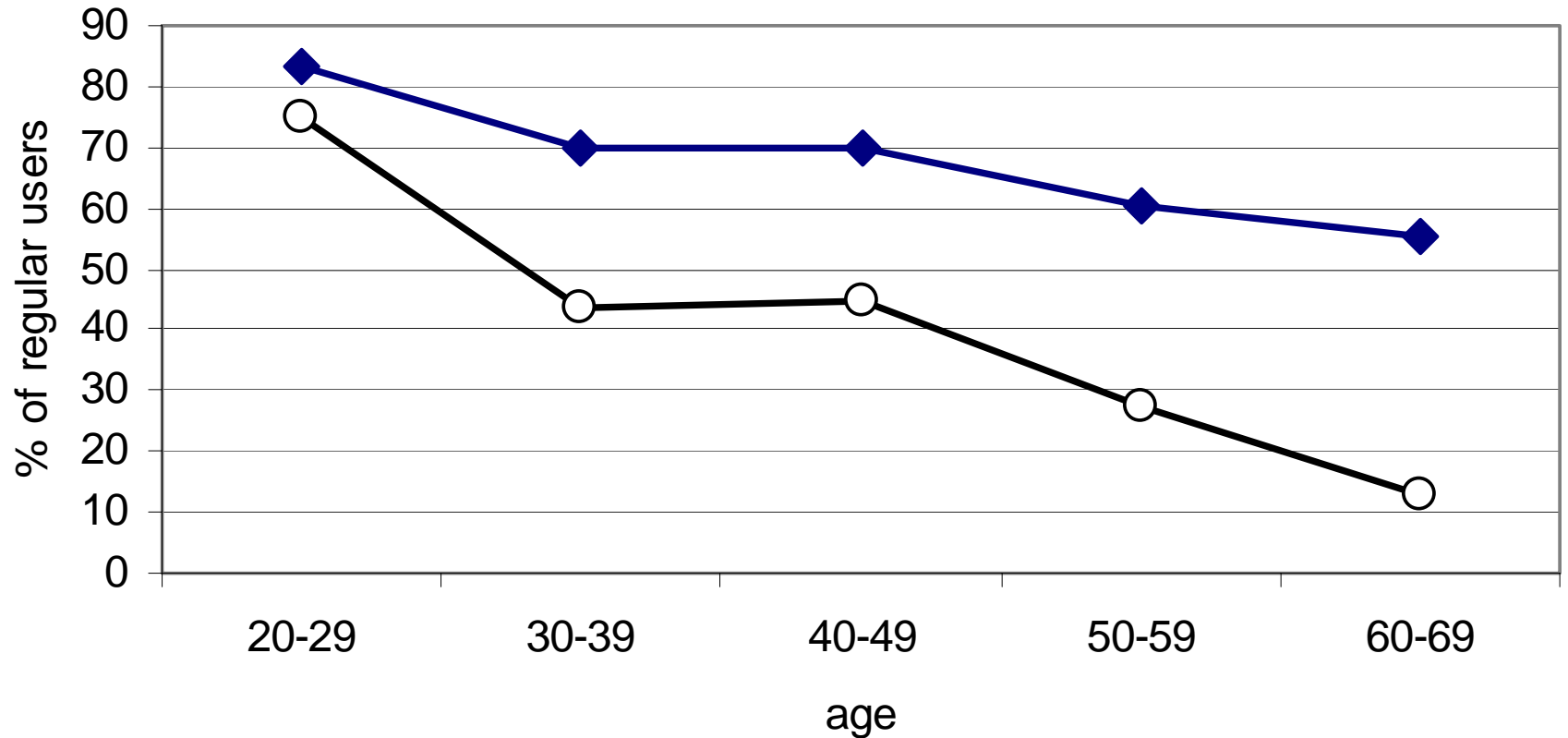
[Federal Office of Statistics]

① Higher cumulative exposure ? *IMBEI*

Number of public phones
in Germany
(1990 to 2003)



① Higher cumulative exposure ? *IMBEI*

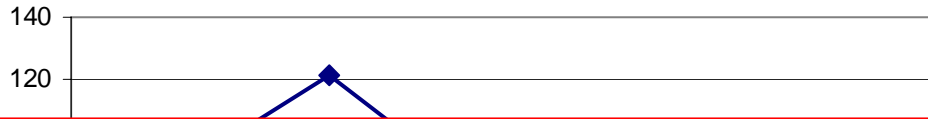


[Christensen et al., 2004]

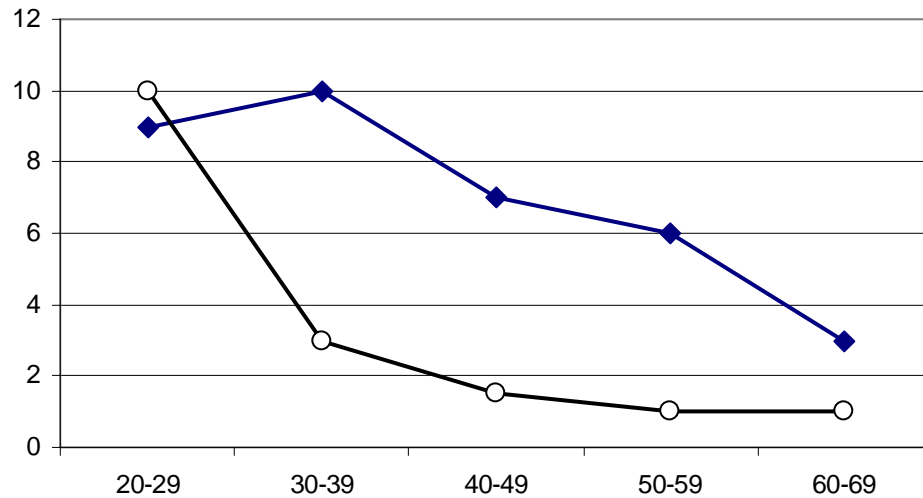
—◆— male —○— female

Proportion of regular MP users by age group

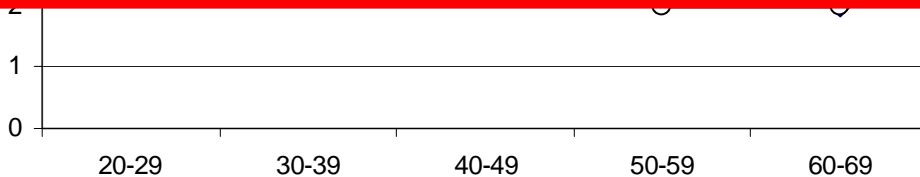
① Higher cumulative exposure ? *IMBEI*



Number of calls per month



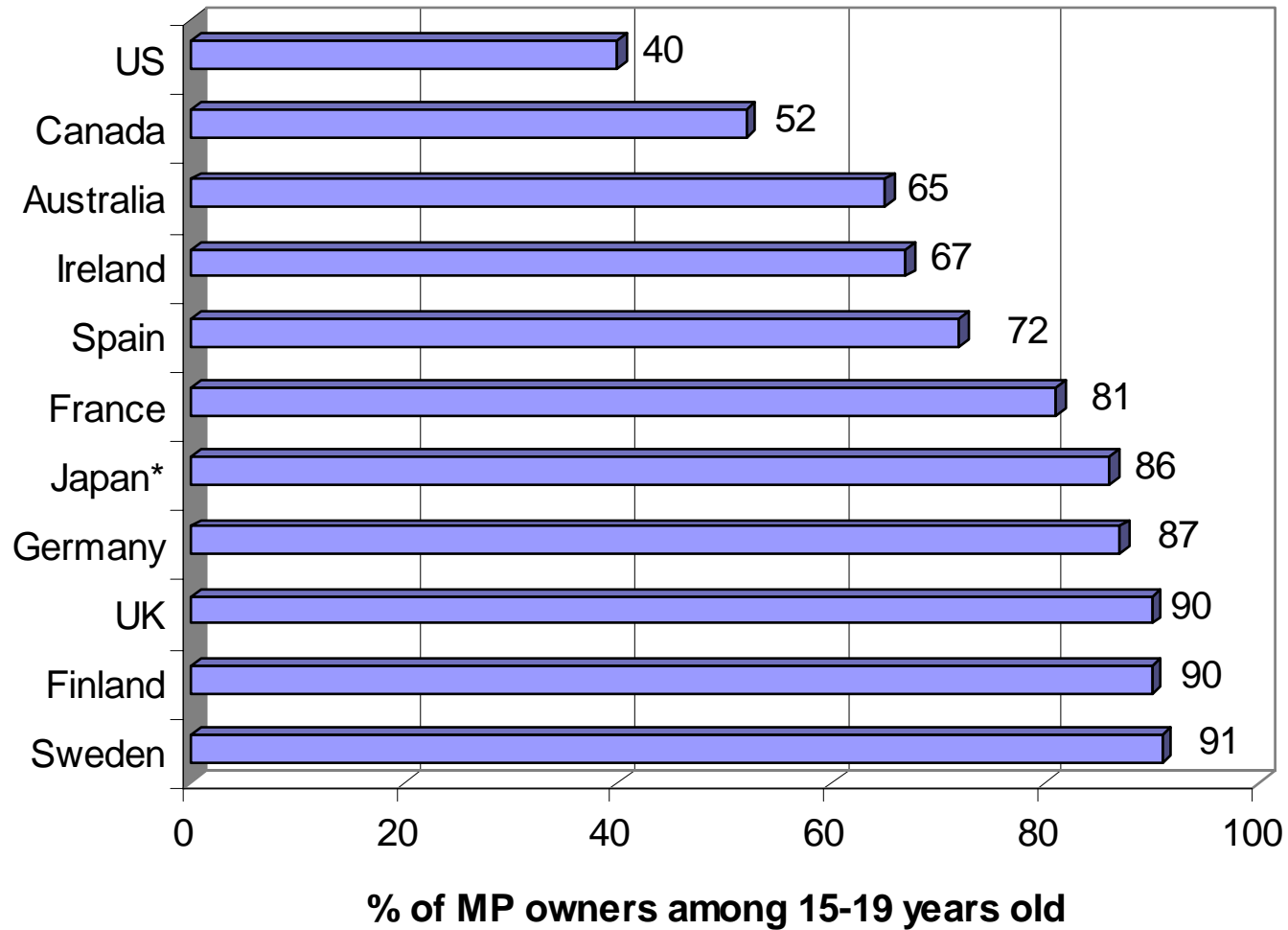
Minutes of MP use per day



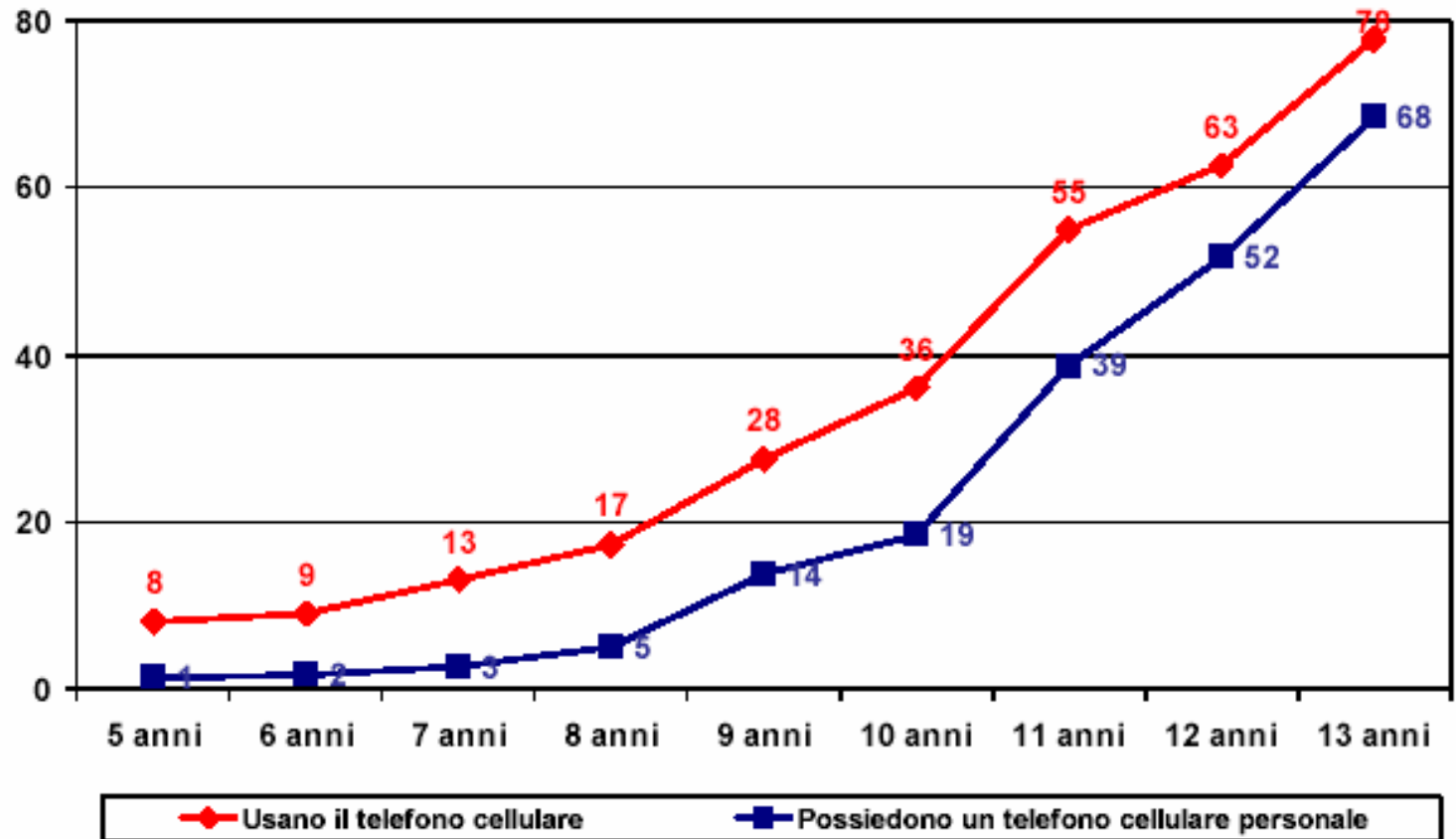
Today's children will have a higher cumulative exposure because:

- they have a longer lifetime period of exposure
- they use mobile phones more often, because
 - the use of mobile phones gets cheaper and cheaper
 - mobile phones become more and more devices of everyday's life
 - children are very familiar with the technology
- mobile phones are particularly attractive for children; even if they don't use it for making calls, mobile phones offer a variety of other features

Current patterns ? Typical characteristics ?



MP use and ownership by age, Italy, 2002:



Australian Kids Consumer Insights, 2/2003:

	Kids aged 6-9	Kids aged 10-13
Sometimes use a friend's mobile phone	6%	22%
Sometimes use their parent's mobile phone	93%	59%
Own their own mobile phone	5%	36%

Mobile phone ownership, all ages

Africa, 5/2004:

2.8% fixed-line customers compared to 6% mobile phone customers
annual increase of 65% over the last 5 years

China, 7/2002:

15% mobile phone customers, corresponds to 180 million people

■ Studybase

Period: November 2002 – February 2003

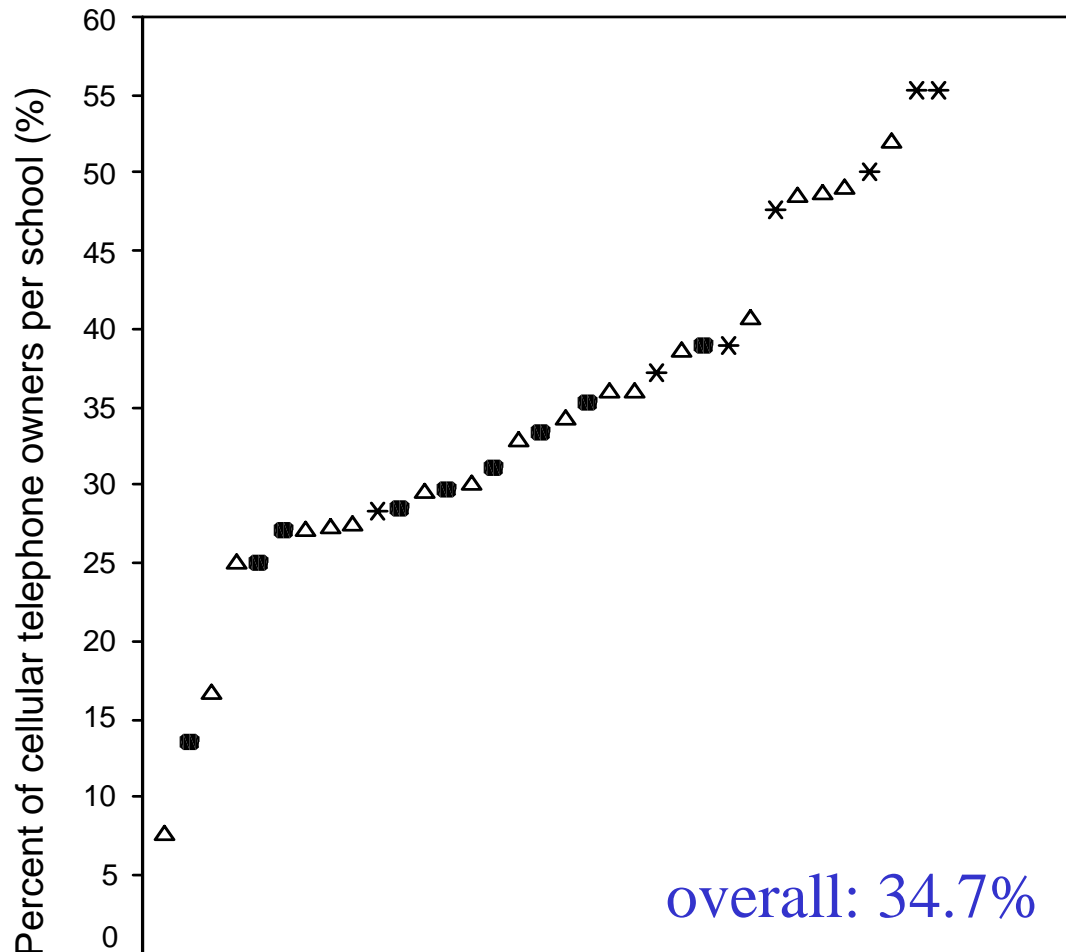
Location: Mainz, Germany (city with about 200 000 inhabitants)

Population: All children in their fourth elementary school year (typically aged 9-10 years) in Mainz and near surroundings.

Participation: 1933 children from 34 primary schools (participation rate of 87.8%; 110 children did not attend school at the day of the interview, 158 children from 3 schools that refused participation).

Interview: standardized questionnaire with 14 easy-phrased questions, read out loud in class by a trained interviewer, teacher questionnaire

Current patterns ? Typical characteristics ?



Proportion of MP
owners by school

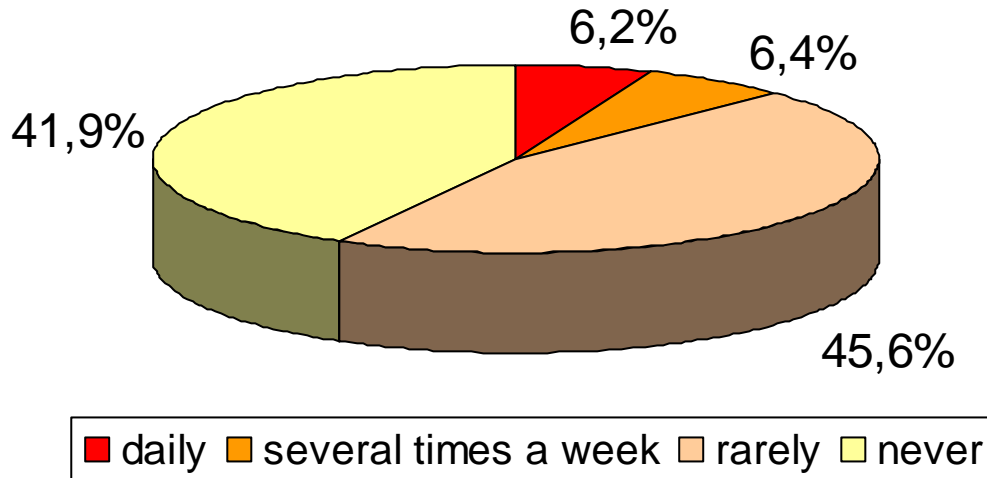
school-location

■ Surroundings

△ Suburbs

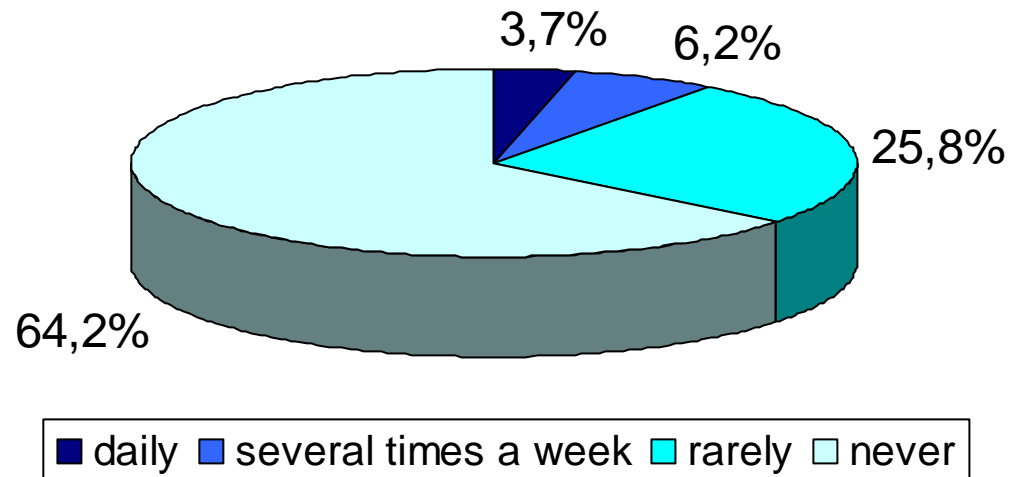
* City

Current patterns ? Typical characteristics ?



← Mobile phone use
for making calls

Mobile phone use →
for sending text messages



Current patterns ? Typical characteristics ?

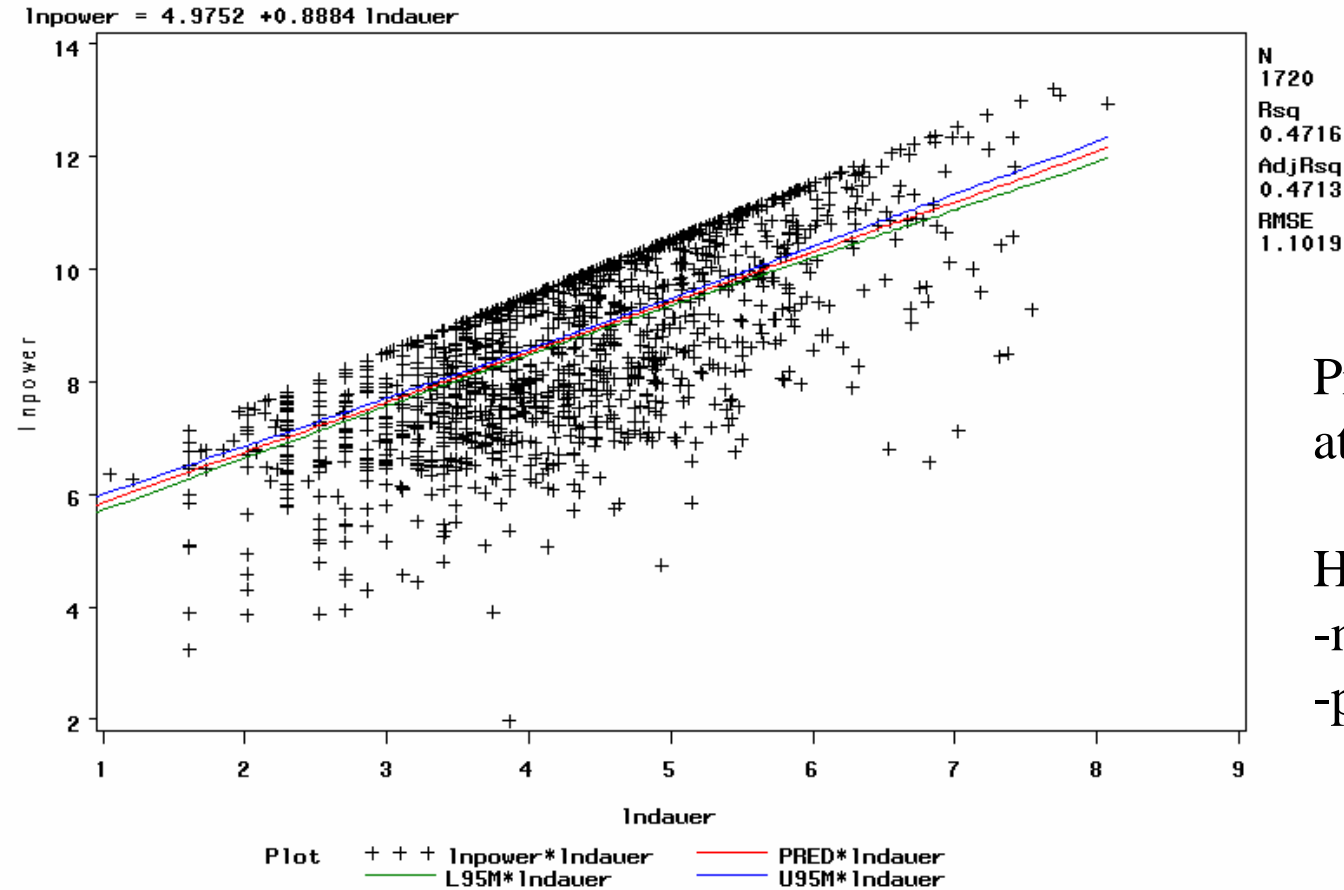
	MP ownership	MP regular use
Increasing age	↗	↗
Being an only child	↗	-
Watching TV (>3 hrs/day)	↗	↑
Computer games (>3 hrs/day)	↗	↑
Membership sport club	↗	↗
Picked up from school by car	↑	-
Going to bed late	↑	↑
Foreign children in class (>14)	↑	-
Socially disadvantaged in class (>14)	↗	↑

no impact: gender, attention of the class, private/state-run school, location

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- The prevalence of mobile phone ownership and use is already very high among teens and increasing among younger children
 - There is variation across countries but a general trend of increasing mobile phone penetration
 - Due to the costs associated with the purchase and the use of a mobile phone, the finding of a high prevalence among children from socially disadvantaged families is rather surprising

③ Types of exposure ?

I – Radiowaves from mobile phones



Proportion of calls totally
at highest power level:
31.1%

Highest variation with:

- network
- phone model

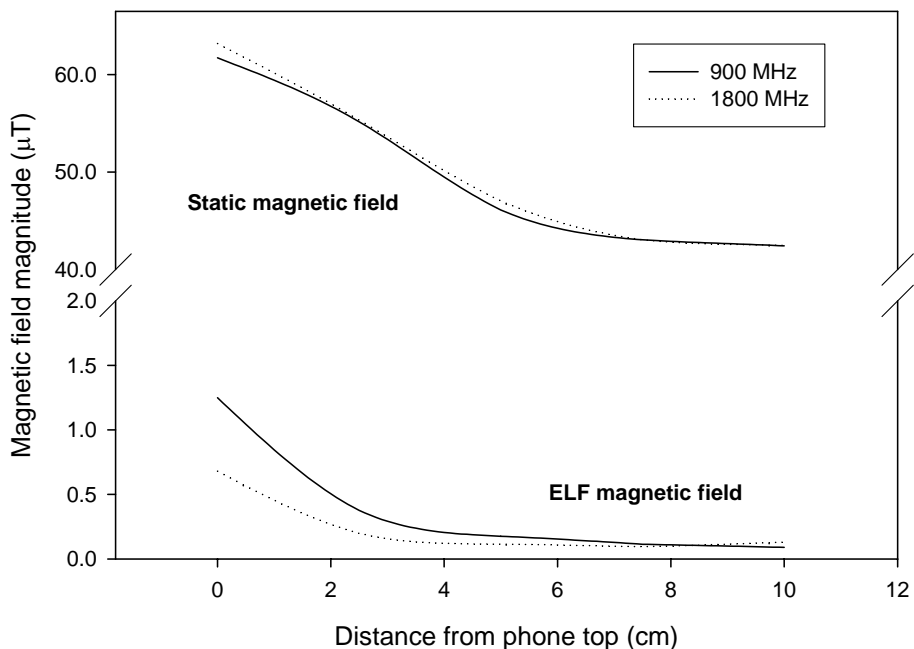
③ Types of exposure ?

II – ELF-EMF from mobile phones

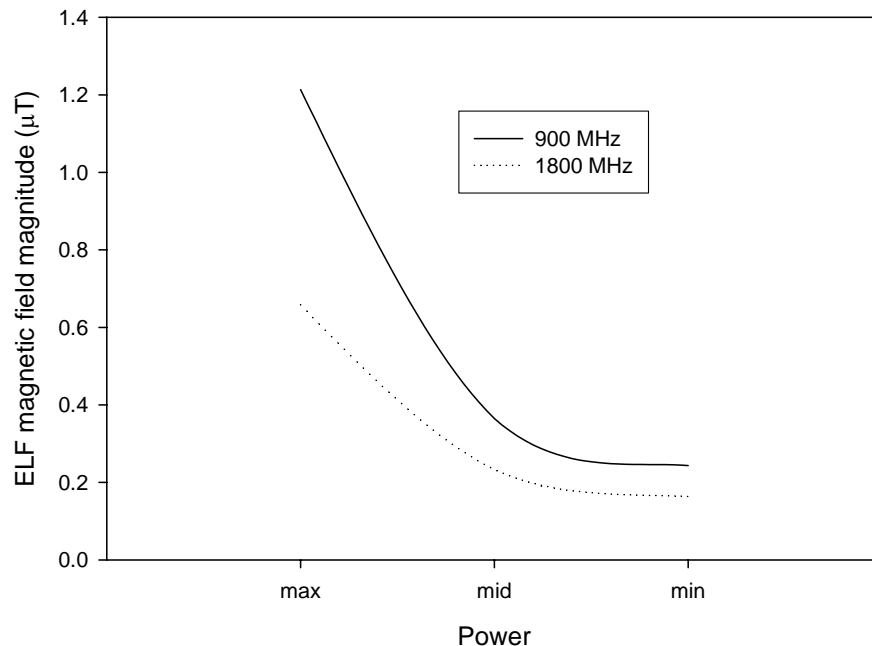


[Data provided by Dr J Bowman, U.S. National Institute for Occupational Safety and Health (NIOSH); measurements supported by Interphone and NIOSH.]

Magnetic Field Profile with Distance from Phone
Nokia Mobile Phone



ELF Magnitude vs. Power Level
Nokia Software Modified Phone



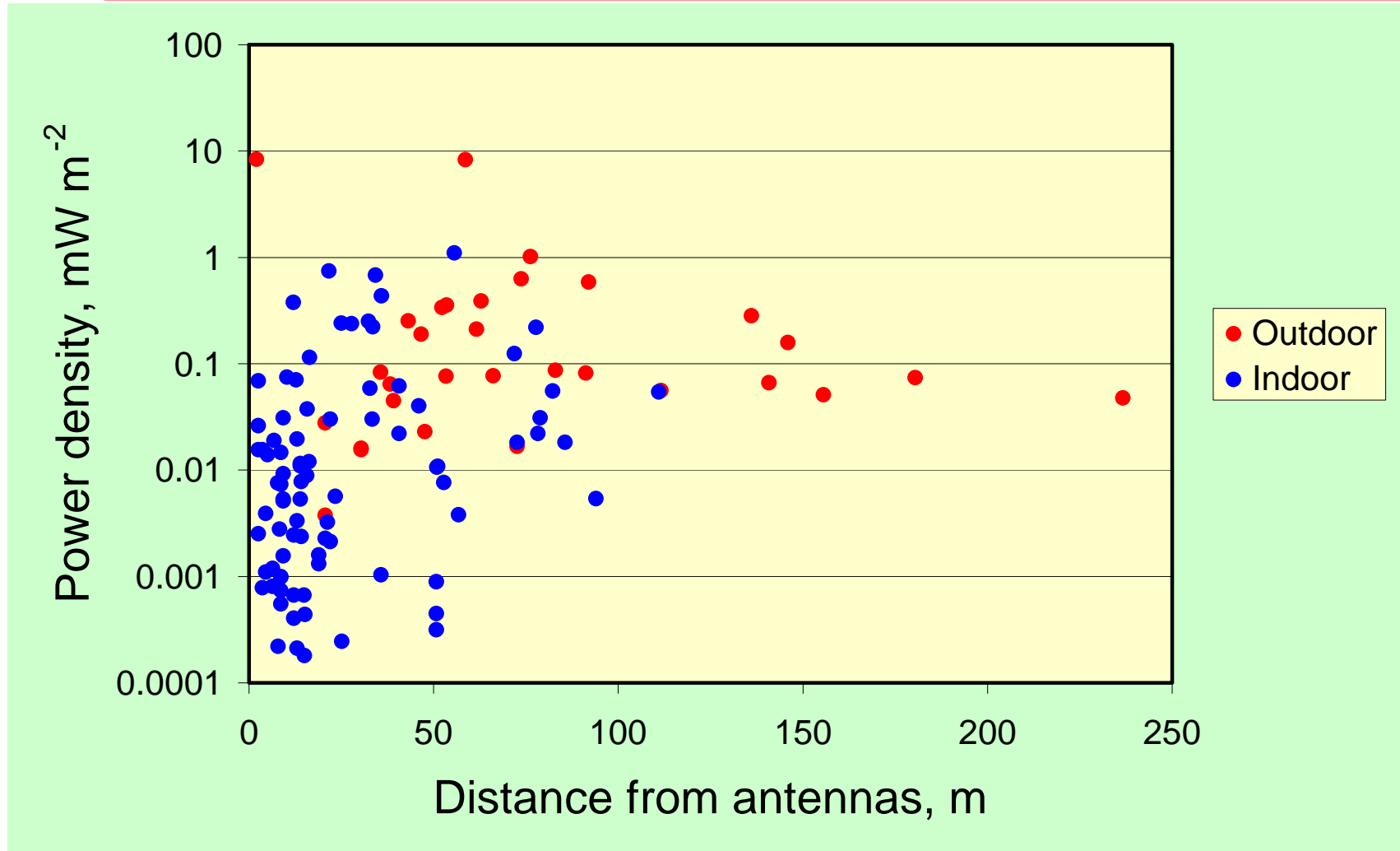
③ Types of exposure ?

II – ELF-EMF from mobile phones

- source of ELF-MF: during the pulsed transmissions from digital phones, a lot of current is drawn from the battery
- dominant frequency in GSM phones: 217 Hz, the pulse rate.
- variable field pattern around phones from different makes; analog phones without pulses have much lower ELF emissions than digital phones
- magnitude of ELF-MF own measurements: 0.2 – 0.8 μT
- due to the pulsed signal, magnetic fields from GSM phones have a time derivative dB/dt about 100 times greater than the derivative of power-frequency MF with the same magnitude; since dB/dt determines the electric fields induced in the brain, these emissions should be studied further.

③ Types of exposure ?

III – Environmental exposures to radiowaves



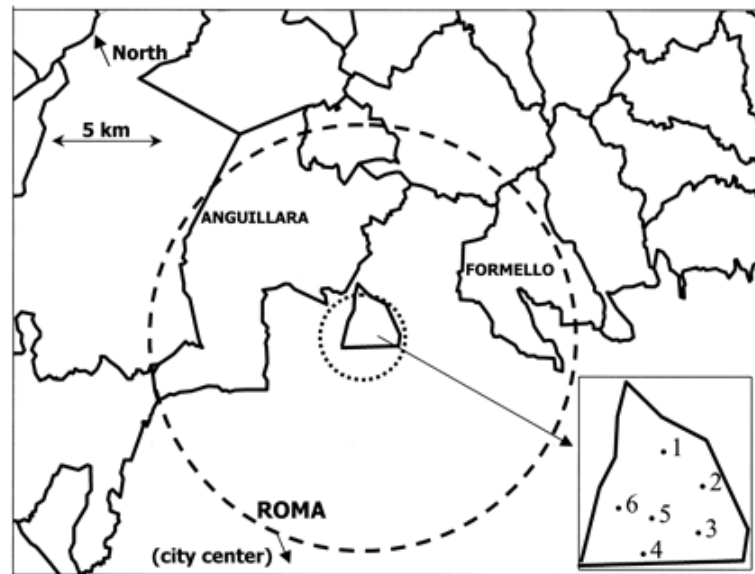
[provided by Dr S Mann, NRPB]

Mobile phone base stations

③ Types of exposure ?

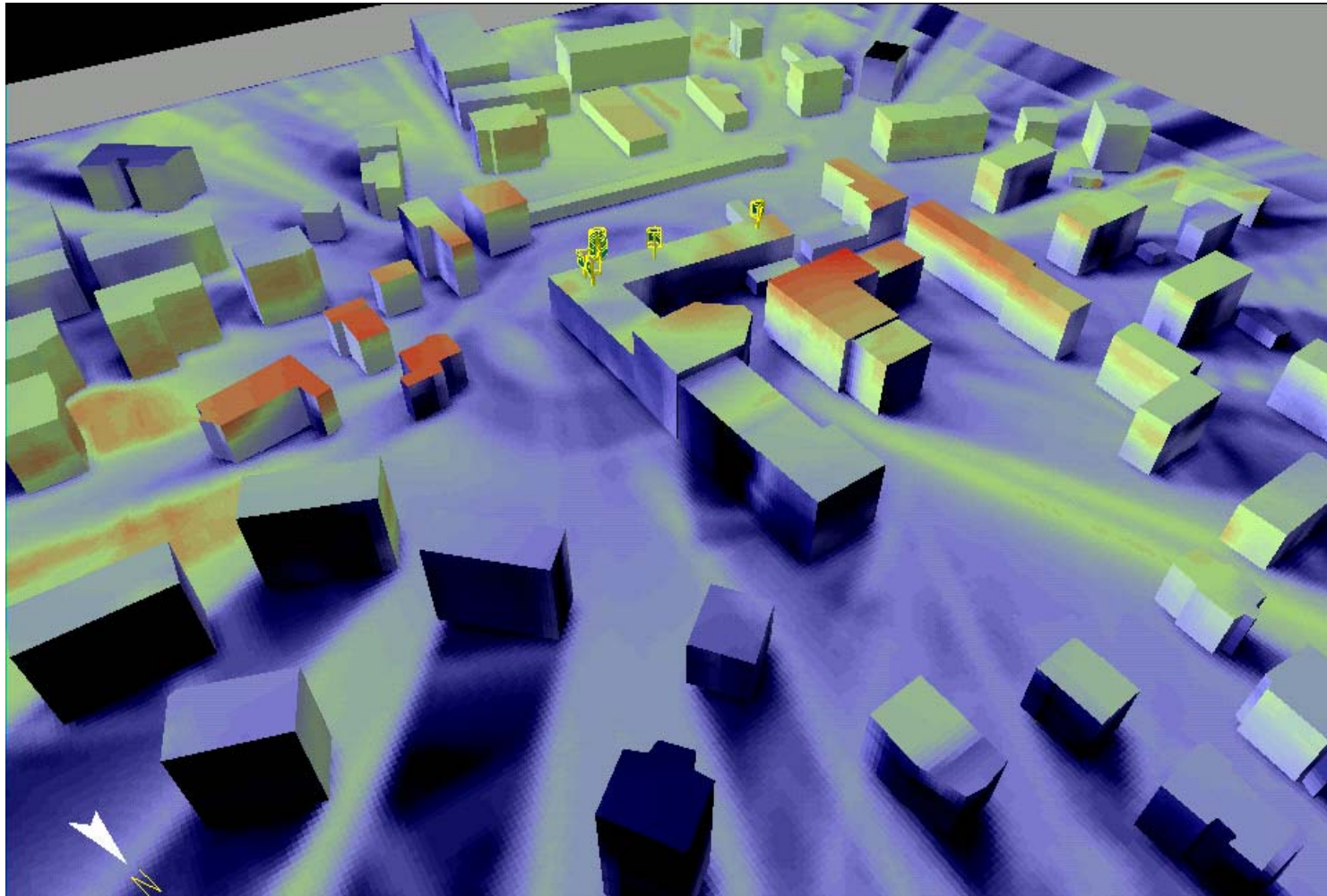
III – Radiowaves from environmental sources

- ecological study in the vicinity of Vatican Radio station
- sample measurements revealed E-fields of 2-20 V/m in a distance of 1-4 km
- increased childhood leukemia incidence within 4 km of the transmitters, but based on only 4 cases
- three further ecological studies on this subject with equivocal results



③ Types of exposure ?

III – Radiowaves from environmental sources



[Source: BAKOM]

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- Mobile phones operate at maximum power in a relevant fraction of all calls
 - Mobile phones can produce ELF-magnetic fields up to some μT
 - Compared to emissions from mobile phones, exposures from other sources of radiowaves are very low; however, for young children, who use mobile phones rather sparsely, continuous exposures from sources like TV and radio transmitters may be relevant

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- there is already a substantial proportion of children who use mobile phones regularly; among teens, the number of non-users is steadily decreasing towards a very minor fraction
 - exposure assessment in epidemiological studies is easier than for adults, due to fewer competing exposure sources and less mobility, leading to less exposure misclassification for analyses
 - today's children will have a much higher cumulative exposure than today's adults when they are at their age
 - mobile phones are dominant sources of radiowave exposures and relevant sources of ELF-EMF