

## Statistical quantification of the effects of preventive strategies



Geir Egil Eide will defend his thesis for the grade of Dr. Philos. at the University of Bergen (UoB) on Friday 18 April 2008. The thesis' title is:

“Attributable fractions used for partitioning risk and evaluating disease prevention. Concepts, estimation, interpretation and presentation.”

A disease will usually have many causes and raised occurrence of a disease in a population may be prevented in multiple ways. Statistical methods for estimating the percent of diseased that may be prevented by eliminating or reducing exposure to various harmful agents are essential for the planning preventive strategies. In a public health perspective

eliminating a very common exposure giving slightly increased occurrence of disease may be as effective as eliminating a rare exposure with very high risk of disease. The proportion of the diseased cases that might have been avoided by eliminating an exposure is termed the exposure's *attributable fraction*. For elimination of multiple exposures a combined attributable fraction may be calculated. The concept may be applied in global as well as local studies of strategies for preventing disease or death.

The thesis consists of an overview and 5 articles published in international scientific journals. It develops formulas for attributable fractions for situations with multiple risk factors. It is shown how the effects of stepwise removal of one exposure at a time in a different orderings can be estimated and it suggests a method for how a combined attributable fraction can be reasonably apportioned to the single exposures involved illustrated by examples from the Hordaland Study of Chronic Lung Disease. This may for instance be used in liability law to apportion responsibility in situations where a disease may have several causes. The methodology is based on probability theory for fair distribution of profit to individuals in a coalition with unequal input in games. The thesis also points out future directions for developing statistical methods for attributable fractions that takes time from exposure to disease into account. Articles included in the thesis have been cited by research groups at the World Health Organization (WHO) and others that work with preventing disease.

The thesis emanates from the Department of Public Health and Primary Health Care (ISF) at the UoB and has been carried out at the Centre for Clinical Research (CCR), Haukeland University Hospital. Supervisor has been Prof. Ivar Heuch, Mathematical Department, UoB.

### Personalia:

Eide was born in Bergen in 1951. He has a Cand. Real. degree in mathematical statistics from UoB in 1977 and has held positions as researcher at the Section for Medical Informatics and Statistics, UoB 1978-1988, as associate professor at the Department of Mathematics and Statistics, Norwegian School of Economics and Business Administration 1988-1999, and since 1999 as biostatistician the CCR and associate professor II at the Section for Epidemiology and Medical Statistics, ISF, UoB.

### Time and place for trial lectures:

17 April 2008 at 14:15. Subject of own choice: "Possibilities with fractional polynomial regression."

17 April 2008 at 15:15. Subject given: "Attributable fractions in cancer epidemiology: What is the practical benefit?"

Place: Aud. 2, the Building of BB, Haukeland University Hospital, Jonas Lies vei 91, Bergen

### Time and place for defence of thesis:

18 April 2008 at 11:15, Aud. 2, the Building of BB, Haukeland University Building, Jonas Lies vei 91

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The thesis can be borrowed from the University of Bergen Library, Section for Medicine, Dentistry and Health Sciences. It can also be obtained directly from the candidate.