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**Title:** Twenty years with RHINE – Patterns and implications of non-response

Dr. Ane 7727 Johannessen ane.johannessen@med.uib.no <sup>1</sup>, Prof. Dr Thorarinn 20725 Gislason thorarig@landspitali.is MD <sup>2</sup>, Prof. Dr Vivi 20726 Schlünssen VS@MIL.AU.DK MD <sup>3</sup>, Prof. Dr Karl 20727 Franklin karl.franklin@surgery.umu.se MD <sup>4</sup>, Prof. Dr Kjell 20728 Toren Kjell.Toren@amm.gu.se MD <sup>5</sup>, Dr. Mathias 21201 Holm mathias.holm@amm.gu.se MD <sup>5</sup>, Prof. Dr Rain 21207 Jögi Rain.Jogi@gmail.com MD <sup>6</sup>, Prof. Dr Cecilie 21208 Svanes cecilie.svanes@helse-bergen.no MD <sup>7</sup>, Prof. Dr Ernst 21213 Omenaas ernst.omenaas@helse-bergen.no MD <sup>1</sup>, Dr. Francisco Gomez 21219 Real fgreal@broadpark.no MD <sup>8</sup>, Mr. Ferenc 21221 Macsali ferenc.macsali@med.uib.no MD <sup>9</sup>, Dr. Trude Duelien 21223 Skorge trude.duelien.skorge@helse-bergen.no MD <sup>7</sup>, Ms. Marie 21224 Waatevik marie.johanne.waatevik@helse-bergen.no <sup>1</sup>, Ms. Eirunn Waatevik 21225 Saure eiru@mac.com MD <sup>7</sup>, Prof. Dr Torben 21227 Sigsgaard TS@MIL.AU.DK MD <sup>3</sup>, Dr. Bryndis 21228 Benediktsdottir brynben@hi.is MD <sup>2</sup>, Dr. Roy Miodini 21229 Nilsen roy.nilsen@uib.no <sup>1</sup> and Prof. Dr Christer 21230 Janson christer.janson@medsci.uu.se MD <sup>10</sup>. <sup>1</sup> Centre for Clinical Research, Haukeland University Hospital, Bergen, Norway ; <sup>2</sup> Dept. of Allergy, Respiratory Medicine and Sleep, Landspítali University Hospital, Reykjavik, Iceland ; <sup>3</sup> Department of Public Health, Aarhus University, Aarhus, Denmark ; <sup>4</sup> Department of Surgical and Perioperative Sciences, Surgery, Umeå University Hospital, Umeå, Sweden ; <sup>5</sup> Occupational and Environmental Medicine, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden ; <sup>6</sup> Lung Clinic, Foundation Tartu University Clinics, Tartu, Estonia ; <sup>7</sup> Department of Occupational Medicine, Haukeland University Hospital, Bergen, Norway ; <sup>8</sup> Institute of Medicine, University of Bergen, Bergen, Norway ; <sup>9</sup> Department of Obstetrics and Gynecology, Haukeland University Hospital, Bergen, Norway and <sup>10</sup> Department of Medical Sciences, Respiratory Medicine and Allergology, Uppsala University, Uppsala, Sweden .

**Body:** Background: The Respiratory Health in Northern Europe (RHINE) study started in 1990 and has for more than 20 years been conducted in study centers in Denmark, Sweden, Norway, Iceland and Estonia. Aims: To examine if and how non-response over time affects prevalence and association estimates. Methods: Participants answered questionnaires in 1990, 2000 and 2011-12. We compared age and sex distribution between those who responded only in 1990, and those who responded in both 1990 and 2011-12. We compared baseline prevalence of 10 respiratory symptoms and also associations between age/sex and asthma, rhinitis and wheeze between all 1990 responders and those who also responded in 2011-12. Results: Of 21673 subjects aged 20-44 at baseline, 61% participated also in 2011-12 (N=13142). Long-term responders were slightly older than non-responders in 2011-12 (32.1 yrs versus 31.0 yrs (p<0.05)), and a larger proportion was female (53% vs 48% (p<0.05)). There was a slightly lower baseline

prevalence ( $p < 0.05$ ) of wheeze, dyspnea and cough symptoms among long-term responders (e.g. waking with dyspnea 4.3% (3.9, 4.7) and chest tightness 10.7% (10.1, 11.3)) than among the total population (e.g. waking with dyspnea 4.8% (95%CI 4.5, 5.2) and chest tightness 11.4% (95%CI 10.9, 11.8)), but no difference in asthma and rhinitis outcomes. Association measures between age/sex and asthma, rhinitis and wheeze were not affected by long-term follow-up. Conclusions: Long-term responders were slightly older and more often women than non-responders. Long-term responders had slightly less baseline respiratory symptoms than the total baseline population, but associations between age/sex and respiratory symptoms do not differ.