Supplementary methods S1. Fine dust emission estimates

The license database of the province contained modeled farm dust emission levels (PM10, g per year) for each farm. These emission levels were calculated by summing the products of estimated PM10 emission factors (g per year per animal), and the number of allowed animals per stable*. Weighted dust emissions from farms within 500 m and 1000 m from the home address were calculated by summing the products of the squared inverse of the distance between a farm and a home address and the farm's fine dust emission (PM10, g per year per m^2).

* *Reference: Hofschreuder, P. ,Aarnink, A.J.A., Ogink, N.W.M., Measurement protocol for emissions of fine dust from animal housings, Wageningen : Animal Sciences Group, 2007*

Supplementary methods S2. Migration out of the study area: Analysis 1.

Deregistration from GP

Possible migration out of the study area due to health problems, was investigated by comparing whether the number of deregistrations from GPs for asthma and COPD patients differed between the patients who live in close proximity to livestock farms and patients who live further away. In the Netherlands, every resident is obligated to be on the list of just one GP. Therefore deregistration is a good indication for migration. Databases of all participating GPs was used, and the number of asthma and COPD patients in 2009 in Q1 (< 290 m to nearest farm) and Q4 (> 640 m to nearest farm) was compared with the number of patients in both groups which were traced back in GP-databases of 2012. The number of deregistrations among asthma and COPD patients in Q1 was 29/1962 (1,48%) and in Q4 69/2741(2,5 %). Multilevel analyses were conducted as the data was hierarchically structured (patients are nested within general practices). Analyses were adjusted for age (polynomial) and gender. The dependent variable was deregistration and the independent variable was the group variable Q1, where 0 refers to the patients who live far away from farms (Q4 > 640 m) and 1 refers to subject who live close to farms (Q1 < 290 m). This resulted in an inverse association with deregistration from the GP and living in close proximity to farms (OR 0.55 (0.34- 0.89). This indicates that asthma and COPD patients living in close proximity to farms migrate *less often* out of the area than asthma and COPD patients living far away from farms.

Supplementary methods S3. Migration out of the study area: Analysis 2.

Number of years in current home and the distance to the nearest farm

The association between the number of years subjects live in their current home and the distance to the nearest farm was investigated. The number of years living in the current home can be seen as a proxy for migration; the longer subjects live in their home, the less migration. In order to assess whether health status influences this association, the analyses were stratified for the general population, current asthma patients and COPD patients. All analysis were adjusted for age. Generalized additive models (smoothing) were conducted by using 'gam' in R. The shape of the relationships between the number of years subjects live in their current home and the distance to the nearest farm was studied by means of a penalized regression spline using the (default) "thin plate" basis as implemented in the R package mgcv.

Selection of smoothing parameters was based on the Un-Biased Risk Estimator (UBRE) criterion (a scaled version of the AIC). The estimated smooth curve was obtained by plotting predicted responses across a range of exposure values, while fixing other covariates in the model to average levels. Supplementary figure S1 shows age-adjusted spline plots for the three strata, which indicate an overall decreasing trend for the number of years in the current home and a larger distance to the nearest farm. Although the interpretation of this trend is limited by the cross-sectional nature of the analysis, it is important to notice that the same trends are seen for the general population, and for COPD patients and current asthma patients.