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Title: Home environment and asthma, respiratory symptoms, FeNO and tear film break up time (BUT) among junior high school students in Penang, Malaysia

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Body: Background: We investigated associations between home environment and respiratory symptoms, FeNO (NIOX-MINO) and tear film break up time (BUT) in students in Malaysia. Methods: Totally 8 junior high schools were selected in Penang, 4 classes per school, and 20 students per class, 368 (58%) participated. Multiple logistic and linear regression was used, adjusting for gender, race, smoking and atopy. Results: Median FeNO was 17ppb (IQR 10-39), and 14% had wheeze, 38% daytime and 11% night time attacks of breathlessness last 12 months, 11% doctors' diagnosed asthma and 37% any respiratory infection last 3 months. Wheeze was more common in wooden houses (OR 2.4 95% CI 1.2-4.7) and homes with dampness/moulds (OR 2.0 95% CI 1.04-3.9) especially floor dampness (OR 3.6 95% CI 1.2-11.2). Daytime breathlessness was more common if keeping cats (OR 1.8 95% CI 1.02-3.2). Night time breathlessness was more common in wooden houses (OR 2.4; 95% CI 1.1-5.3) and homes with mouldy odour (OR=9.3; 95% CI 1.5-56.6) or other odour (OR 3.6; 1.1-11.6). Respiratory infections were more in homes with ETS (OR 1.5 95% CI 1.0-2.3). BUT was shorter in homes with new floor material (p=0.02) or with pets (p=0.02) especially birds (p=0.01). FeNO was higher in students with eye symptoms (p=0.001) and shorter BUT (p=0.03). FeNO was not associated with any home environment factor. Conclusion: Respiratory symptoms were more common if living in a home made of wood, with a cat, ETS; dampness/mould or indoor odour. Pet keeping and emissions from new floor material could impair tear film stability. These results indicate a link between lower airway inflammation and eye irritation.