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**Urbanization in Indonesia and its impact on non-communicable diseases: a clinical, epidemiological, and immunological study**

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## Stellingen behorende bij het proefschrift

### **URBANIZATION IN INDONESIA AND ITS IMPACT ON NON-COMMUNICABLE DISEASES** A Clinical, Epidemiological, and Immunological Study

1. Helminth infection and anthelmintic treatment could affect metabolic profiles and hormones (*this thesis*), therefore monitoring of metabolic health in conjunction with the ongoing deworming programs in rural areas endemic for helminth infections is important.
2. Rural populations in Indonesia have relatively better metabolic profiles compared to their urban counterparts (*this thesis*).
3. Lifelong residence in rural areas does not protect its community members from adverse metabolic changes when encountering urbanization or adoption of urban lifestyle (*this thesis*).
4. The majority of individuals with diabetes in Indonesia were undiagnosed and untreated, especially in rural areas (*this thesis*). This warrants extensive action plan from all related stakeholders.
5. Indonesian urban young adults with allergic rhinitis have stronger inflammatory immune response in the nasal mucosa compared to their rural counterparts (*this thesis*).
6. The largest contributor to the body mass index (BMI) rise in low-middle income countries, over the last three decades, is the increase of BMI in rural areas, possibly due to transition from rural undernutrition to general and complex malnutrition with excessive consumption of low-quality calories. (*Bixby H, et al. Nature, 2019*)
7. Urbanization is unavoidable. Thus, it is important to create an urban environment that can support good health. (adapted from *United Nations Sustainable Development Goals (SDG) 11: Sustainable Cities and Communities*)
8. Urban as compared to rural living is associated with a pro-inflammatory phenotype, which might be due to differences in dietary and nutrient intake, opening up possibilities for intervention. (*Temba GS, et al. Nature Immunology, 2021*)
9. Multidimensional omics-based data not only can provide insight into the mechanisms of obesity, but also might indicate early markers of transition towards different chronic diseases stemming from obesity. (*Watanabe K, et al. Nature Medicine 2023*)
10. Multidimensionality and changing dynamics of urbanization warrants multi- and inter-disciplinary collaboration to be incorporated in studies evaluating the impact of urbanization on human health.
11. Learning something new can often feel challenging and intimidating at first, however, with dedication, practice, and persistence, what was once difficult can be a source of enjoyment and satisfaction.
12. A reputable institution and supportive colleagues are essential, but dedicated and encouraging supervisors who can inspire to strive for excellence, can make a PhD journey a rewarding and transformative experience.