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### Empirical essays on education and health

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# Chapter 1

## Introduction

This thesis presents four essays on education and health. Each of these studies can be read independently, although there are connections between the topics discussed in some of the essays. The first essay, presented in Chapter 2, concentrates on health. It examines the effects that Ramadan fasting during pregnancy has on the health of the offspring; it particularly focuses on long-term effects that only show up when the prenatally exposed have grown up and become adults. Chapter 3 to 5 are essays on education. Chapter 3 presents an experiment in which I examine whether teachers give ethnic minority students different grades than ethnic majority students for the same work. Chapter 4 and 5 are meta-analyses, that synthesize and compare the results from previous studies on peer effects. Chapter 4 reviews previous studies on the effect of the average socio-economic status in schools and classes on students' test scores and tries to answer why the results found in these studies differ so much. Chapter 5, like Chapter 3, looks at effects of student ethnicity on test scores. But in this chapter, not students' own ethnicity, but that of their peers is the focus of attention.

The essay in Chapter 2 deals with effects of Ramadan fasting during pregnancy. Each year, many pregnant women fast from dawn to sunset during this Islamic holy month. Medical theory suggests that this may have negative long-term health effects on their offspring (e.g. Barker, 1997). Previous medical research on long-term effects of malnutrition during pregnancy, however, looked at other instances of malnutrition, such as famines (e.g. Roseboom et al., 2000) and there is very little work that concentrates directly on Ramadan fasting during pregnancy. The existing studies on Ramadan during pregnancy show that indeed many pregnant Muslim women (usually between 70 and 90 percent) do fast during Ramadan (e.g. Arab & Nasrollahi, 2001; Malhotra et al., 1989) and that this leads to a deficit in food intake (Arab, 2004). It has also been shown that maternal Ramadan fasting negatively affects the health of the fetus that is in utero at that moment (Mirghani et al., 2004; Mirghani et al., 2005). But thus far, only one study looked at the long-term effects of pre-birth exposure to Ramadan fasting. Almond & Mazumder (2008) use Ugandan census data and find that people who had been exposed prenatally, have higher probabilities of having vision, hearing and mental or learning disabilities as adults. My research builds further upon their work and estimation method.

In this study, I use an Indonesian cross-sectional database. First, I establish whether people may have been exposed prenatally to Ramadan fasting, by using information on ethnicity, birthdates and dates of Ramadan. (Ramadan each year falls about 11 days earlier. Someone born just after a Ramadan has potentially been exposed,

while someone born just before a Ramadan has certainly not been exposed). Subsequently, I compare the health of Muslims who were potentially, versus were not exposed, controlling for their age and sex. Because the timing of Ramadan varies over the years, I am also able to control for birth month, and thus to separate season-of-birth effects from effects of exposure to Ramadan fasting.

My analyses first focus on people's general health, as rated by nurses. After some robustness checks, I look at specific aspects of health that may be affected. I herein particularly focus on health effects that are predicted by medical theory, such as coronary heart disease, diabetes type 2 and kidney problems. These effects are particularly expected among older people. I also look at the sex ratio: in utero, males are more vulnerable to adverse conditions, so that, due to miscarriages and perinatal death, a lower share of males may be expected among those born during, and in the months after Ramadan.

Chapter 3 concentrates on the question how ethnic group membership, independent of any of its correlates, may affect the grades students obtain in school. Grades that teachers give in school have important consequences for students. Yet, grading is often a subjective evaluation procedure. Previous research suggests that this subjectivity may harm certain groups of students. Particularly, ethnic minority children may end up with different grades if their teacher belongs to the ethnic majority, than if their teacher belongs to their own ethnic minority group (Dee, 2005). It is unclear whether this happens because of bias in teachers' grading ("direct grading bias"), or because student performance is indeed altered. The latter may happen if teachers (unwittingly) treat students differently because of the ethnic group they belong to, inducing these students to put in less effort and to perform worse, or if students react to teacher characteristics (e.g. role model effects).

Chapter 3 focuses on the phenomenon of direct grading bias, in which teachers give different grades for the same work, depending on the student's ethnicity. But it also explores whether teachers may be influenced by students' ethnicity in such a way that it may lead them to treat students differentially, which may indirectly affect students' grades. 113 ethnic Dutch teachers each graded ten short essays written by 11-year old students. Unknown to the teachers, the names written on the essays were manipulated to be alternately typical Dutch, or typical Turkish or Moroccan. The experimental design makes it possible to examine whether teachers give ethnic minority students different grades than ethnic majority students for exactly the same work. After grading, the teachers stated expectations for the secondary school track the students would be able to attend in about a year's time. Finally, they completed an Internet questionnaire in which, beside background questions, also attitudes toward ethnic minorities were measured. I test whether teachers have lower expectations from ethnic minority students than from comparable ethnic majority students, and whether teachers hold unfavorable attitudes toward ethnic minority groups in general. Both low expectations and unfavorable attitudes are likely to affect teachers' behavior toward students, and hence to indirectly affect students' performance in school (Jussim & Harber, 1995; Rosenthal & Jacobson, 1965).

Chapter 4 is a meta-analysis that aims to reconcile the findings from previous studies that looked at the effects on students' test scores of their peers' socioeconomic

status (SES). It is well-known that students with a higher SES on average perform better in school. If the SES of their school- and classmates has a separate effect on student achievement above this, this has implications, among others, for school choice debates. School choice may increase the extent to which students with similar SES end up in the same schools. If this happens, and peer effects are present, then high-SES students will benefit from having high-SES peers, while low-SES students suffer from a lack of high-SES peers. Peer effects will then increase achievement gaps between high- and low-SES students.

The variation in the estimates from 30 previous studies on the SES-peer effect is substantial. The hypothesis tested in this meta-analysis is that this variation is related to how these previous studies measured SES, and to their choice of estimation models. SES can for instance be measured using noisy indicators such as whether students are eligible for free lunch, or using less noisy composites that include several of the dimensions of SES, such as parental education and occupation. Composition can be measured at class level, or (which is a noisier measure of students' relevant peer group) at cohort/school level. And there are different ways to deal with the substantial risk of endogeneity bias that studies on this effect run. That is: students may not perform poorly because they attend a school with a low average SES, but they may attend this particular school, and not another one, because they were a priori likely to perform poorly. These measurement and modeling issues may influence the effect sizes that studies find considerably. Also, effects may vary with sample characteristics such as the test type (language vs. math) used.

Chapter 5 reports a meta-analysis on the effects of ethnic minority share among peers on students' test scores. In many countries, ethnic minorities are very unevenly spread over schools. E.g. in countries such as the United States and The Netherlands, most ethnic minority students attend a school in which ethnic minority children constitute the majority of the schools' population (Gijsberts, 2003; Rumberger & Palardy, 2004). A viewpoint often heard from policy makers and in media is that this high minority share has negative effects on the school achievement of the students in such schools, and this is then taken as an argument for desegregation. This study synthesizes the evidence on this peer effect from 13 previous studies. A particular focus is held on effect differences between ethnic groups: although in public debates, often no distinction is made, for instance the effect of the African American share in schools in the USA, may differ from the effect of the immigrant share in schools in various countries. And the achievement of ethnic minority students themselves may be affected more strongly by the minority share than the achievement of students belonging to the ethnic majority. The effect that researchers find may also differ with the type of achievement test (language vs. mathematics) they look at, the age of the students and, like in the previous meta-analysis, with several characteristics of the model chosen by the researcher.

The last chapter, Chapter 6, summarizes the main findings and conclusions from the four essays presented in this thesis.

