PISA 2015

Evaluation of nonresponse in the Netherlands

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Contents

Chapter 1

Introduction

This paper evaluates the potential for bias in survey estimates in the PISA 2015 results for the Netherlands due to nonresponse. A target response rate of 65% is set by the PISA consortium. The final weighted response rate in the Netherlands was 63.3%. A higher nonresponse increases the potential risk for nonresponse error, but higher nonresponse rates do not automatically induce higher nonresponse bias, see for example (Groves, 2006). In this paper we will therefore try to establish if the higher nonresponse rate has led to nonresponse bias.

We will first shortly describe the sampling design used for this study. We then present some cross-tabulations of (unweighted) response rates and background variables. This will give a first impression if there is a relationship between (proxies of the) variables under study and the decision of schools to either participate or not. The following section is a somewhat longer section about representativeness of the study results with respect to school performances on the central examinations. We end with conclusions.

Chapter 2

Sampling design

In total 609 schools are sampled. 203 of these schools belong to the original sample. For each original sampled school, two replacement schools are available. The final sample are those schools that either responded or did not respond. Replacement schools that are not contacted because either the original school or the first replacement school had indicated that they are willing to participate in the PISA study do not belong to the sample[1] and are discarded from further analyses. The sampling design makes uses of three strata, which are constructed on the educational tracks. The first stratum contains schools with students sitting in a Pre-vocational secondary educational track - or *vmbo* in Dutch. The second stratum contains schools with students either sitting in a Senior general secondary educational (*havo*) or University preparatory educational (*vwo*) track. Finally the third stratum is a very small stratum containing private schools. Table 2.1 gives an overview of the number of sampled schools within each stratum in the complete sample.

Table 2.1: Strata and number of schools in the complete sample

	n
stratum 1	336
stratum 2	264
stratum 3	9

Table 2.2 gives an overview of the number of sampled schools within each stratum in the final sample (without unused replacement schools).

Table 2.2: Strata and number of schools in the final sample

	n
stratum 1	175
stratum 2	120
stratum 3	7

[1] These are basically also the schools that eventually participated in the PISA study. A school that withdrew cooperation shortly before the actual test administration has not been replaced anymore.

Chapter 3

Response rates

3.1 Unweighted response rates

Table 3.1 gives an overview of the number of responding schools within each stratum and the unweighted response rates.

Table 3.1: Strata and (unweighted) response

	n response	n nonresponse	Perc. response	Perc. nonresponse
stratum 1	102	73	58	42
stratum 2	84	36	70	30
stratum 3	1	6	14	86

As aforementioned the third stratum of private schools is a very small stratum. This is also reflected by the numbers presented in Table 3.2 which shows the number of participating students within each stratum.

Table 3.2: Strata and number of participating students

	n response
stratum 1	2937
stratum 2	2533
stratum 3	1

Stratum 3 seems problematic in terms of responding, but students visiting private schools in the Netherlands do form a very minor part of the total student population. There are no official statistics on the number of students visiting private schools in the Netherlands, but a recent study issued by the Dutch Department of Education mentions 111 students aged 14 to 16 years old visiting private schools in the Netherlands[1]. The size of a typical cohort in the Netherlands in the third year of secondary education is more than 200,000[2]. The very small percentage of students visiting a private school (0.06%) in the population and the unavailability of background information for private schools made us decide to omit schools and students from stratum three in the analyses presented in Chapter 4.

[1] http://parlis.nl/pdf/bijlagen/BLG6815.pdf
[2] http://statline.cbs.nl/StatWeb/publication/?PA=80040ned

Figure 3.1 shows the responding schools (in blue) and the nonresponding schools (in red) on a map of the Netherlands.

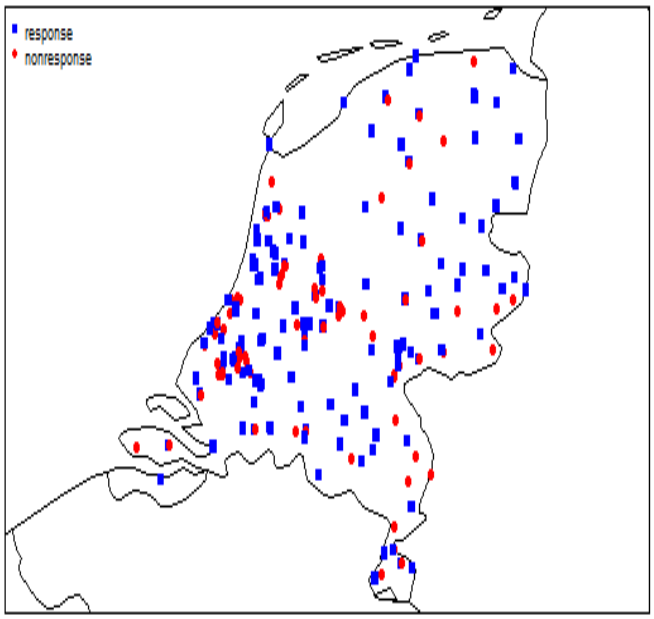

Figure 3.1: Responding and nonresponding schools

Figure 3.1 does not reveal any relationship between regio and the decision of schools to either participate or not.

3.2 Weighted response rates

The original sample included 203 schools, but it appeared that one school did not have any student that belonged to the target population and was therefore considered to be ineligible for the PISA study. Another school was excluded during the field work. The weighted response number was therefore based on 201 schools. In addition three schools had a student response rate between 25 and 50%, and for purposes of calculating weighted response rates these schools are considered nonrespondents. These three schools and their students are retained in the data (because they had a student response rate above 25%)[3]. Table 3.3 gives an overview of the number of responding schools within each stratum and the weighted response rates.

[3]Personal e-mail communication with Keith Rust, WESTAT.

Table 3.3: Weighted response results

Sample	No. Responding schools	No. Eligible schools	Weighted School Response Rates	PISA standard
Original sample	125	201	63.31	65
After 1st replacement	169	201	85.59	
After 2nd replacement	184	201	93.21	

Chapter 4

Representativeness

The core subject of the 2015 PISA cycle was *Science*. We will therefore concentrate on the subjects administered in the central examinations that are most likely to have the highest correlation with performance on *Science*. We have chosen to concentrate on the subjects *Maths A*, *Maths B* and *Physics* for the Senior general secondary educational and University preparatory educational tracks. For the Pre-vocational secondary educational track we will focus on the central examinations subjects *Maths* and *Physics and chemistry I*. Although the actual PISA test administration took place in 2015, the sampling for the study was carried out in 2013 and 2014. We have therefore decided to use the central examinations data of 2013/2014. The school performances on the central examinations are publicly available in the Netherlands[1]. This means that we can match the central examinations results to the complete (final) sample, both to responding and nonresponding schools. It will give us considerable evidence that the higher nonresponse rates did not bias the final survey estimates, if we can establish that there are no (large) differences on these variables which are likely to have a high correlation with the key variables in the study. For each educational track we will compare the complete population results (i.e the overall average across all schools in the Netherlands) with the response group estimate and superimpose the corresponding 95% confidence interval on the response group estimate. In order to assess if - besides the evaluation of the overall mean performance - there are no selection effects across subgroups, we also present the 25th and 75th percentile estimates of the total population and the response sample.

[1] `https://www.duo.nl/open_onderwijsdata/databestanden/vo/Leerlingen/`

4.1 Pre-vocational secondary education, Basic vocational track

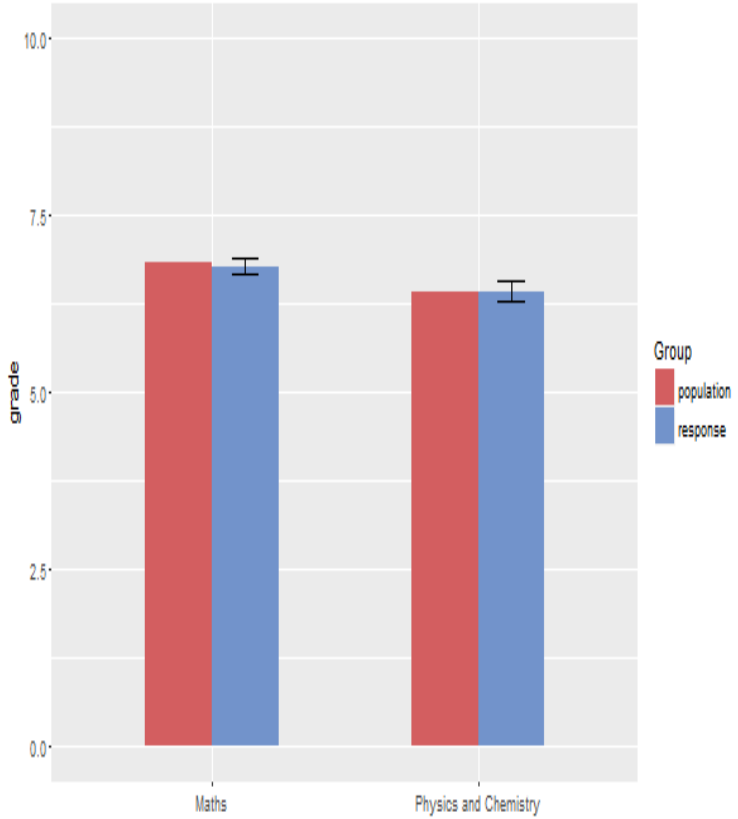

Figure 4.1: Overview population and response estimates on central examinations

Table 4.1: Percentiles maths

Percentile	Population	Response
25%	6.5	6.5
75%	7.2	7.2

Table 4.2: Percentiles physics

Percentile	Population	Response
25%	6.1	6.1
75%	6.75	6.8

4.2 Pre-vocational secondary education, Middle-management vocational track

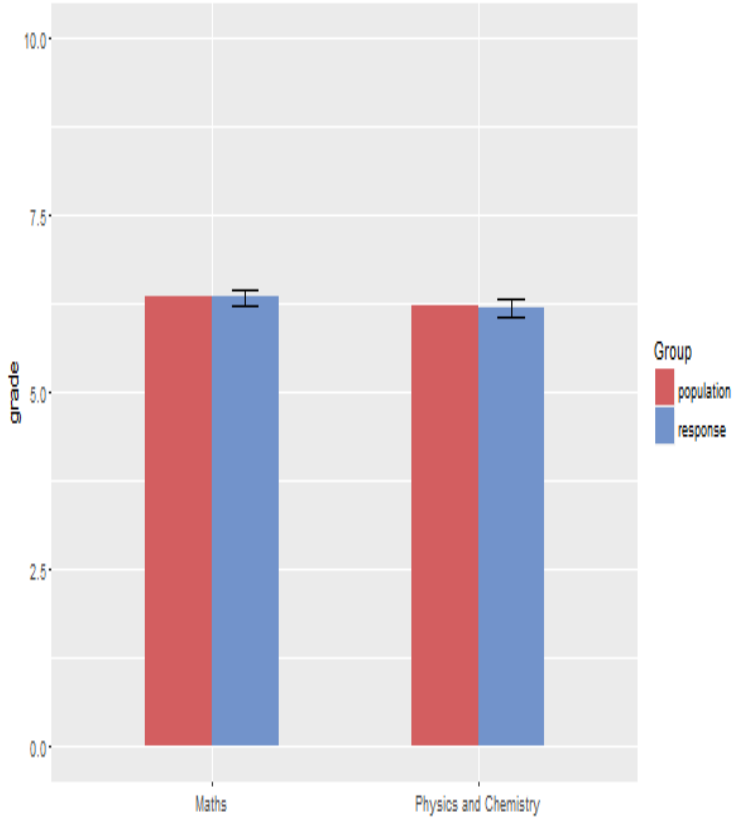

Figure 4.2: Overview population and response estimates on central examinations

Table 4.3: Percentiles maths

Percentile	Population	Response
25%	5.9	6
75%	6.6	6.6

Table 4.4: Percentiles physics

Percentile	Population	Response
25%	5.9	5.9
75%	6.6	6.525

4.3 Pre-vocational secondary education, Combined theoretical and vocational track

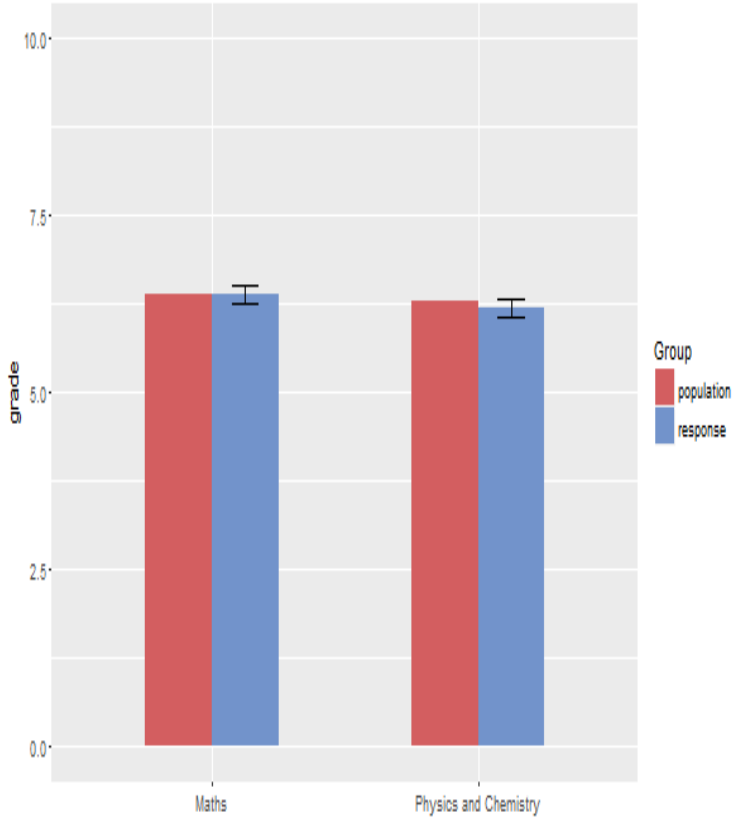

Figure 4.3: Overview population and response estimates on central examinations

Table 4.5: Percentiles maths

Percentile	Population	Response
25%	6.1	6
75%	6.8	6.7

Table 4.6: Percentiles physics

Percentile	Population	Response
25%	5.925	5.9
75%	6.7	6.6

4.4 Senior general secondary education

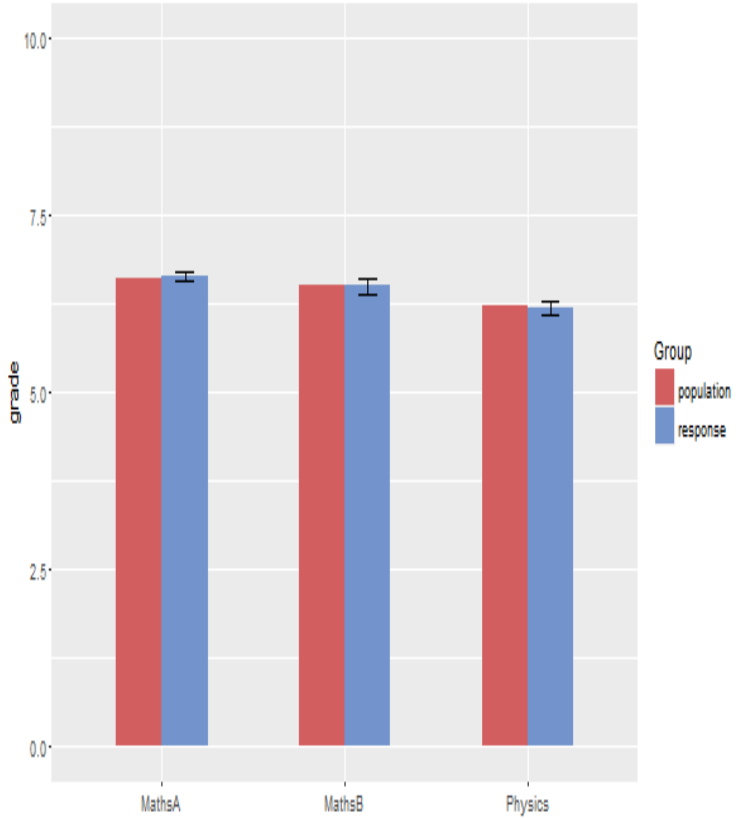

Figure 4.4: Overview population and response estimates on central examinations

Table 4.7: Percentiles maths A

Percentile	Population	Response
25%	6.4	6.4
75%	6.9	6.825

Table 4.8: Percentiles maths B

Percentile	Population	Response
25%	6.1	6.2
75%	6.9	6.8

Table 4.9: Percentiles physics

Percentile	Population	Response
25%	5.9	5.9
75%	6.5	6.5

4.5 University preparatory education

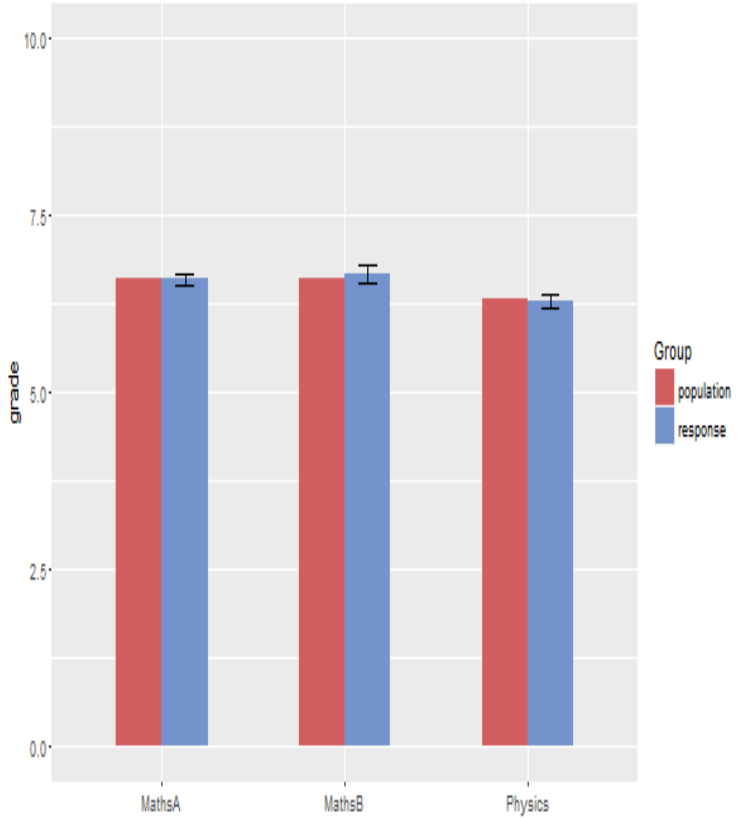

Figure 4.5: Overview population and response estimates on central examinations

Table 4.10: Percentiles maths A

Percentile	Population	Response
25%	6.4	6.4
75%	6.8	6.9

Table 4.11: Percentiles maths B

Percentile	Population	Response
25%	6.3	6.3
75%	7	7

Table 4.12: Percentiles physics

Percentile	Population	Response
25%	6	6
75%	6.6	6.5

Chapter 5

Conclusion

This paper evaluates the potential for bias in survey estimates in the PISA 2015 results for the Netherlands due to nonresponse. Although the nonresponse rate is higher than the standard set by the PISA consortium, there is substantial evidence that the effect on nonresponse error is negligible.

Bibliography

Groves, R. (2006). Nonresponse Rates and Nonresponse Bias in Household Surveys. *Public Opinion Quarterly*, 70, 5, Special Issue 2006, 646–675.