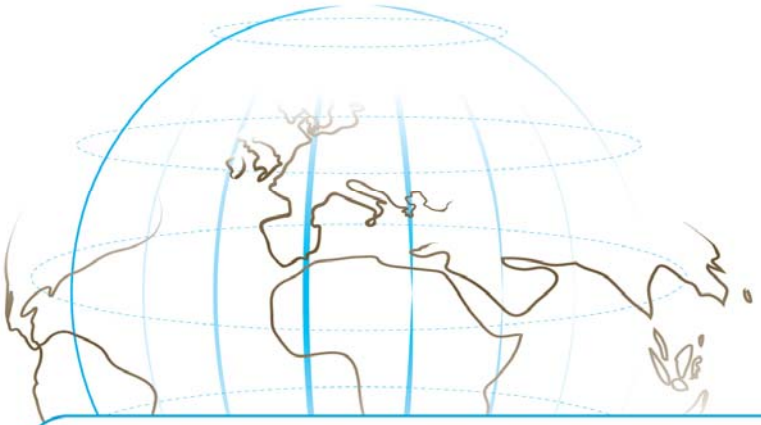

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International Mobility among PhD Candidates at Norwegian Higher Education Institutions

SIU
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PREFACE

The Norwegian Centre for International Cooperation in Higher Education (SIU) is a public administrative agency reporting to The Norwegian Ministry of Education and Research (KD). SIU is Norway's official agency for international programmes and measures related to higher education and primary and secondary education, and is commissioned by several national and international public organisations. SIU is coordinating national measures according to official Norwegian policy within the field of internationalisation, and is responsible for promoting internationalisation, cultural communication and international mobility within the realm of education, and shall through various internationalisation measures contribute to raise the quality of Norwegian education.

As a competence centre, one of SIU's most important tasks is to broaden and strengthen the knowledge foundation for further internationalisation of Norwegian education through reporting and analysis tasks. The purpose of SIU's reports is to provide the authorities and the sector itself with better conditions for developing measures and strategies for internationalisation.

The topic of this report is international mobility among PhD candidates at higher education institutions in Norway, its extent, driving forces and barriers. Mobility as one aspect of internationalisation is a high political priority in Norway. At the same time, there is only very limited knowledge regarding the scope, direction and character of the PhD candidates' international mobility. While comprehensive statistical information is available at bachelor's and master's level, no such information exists for the PhD level. Thus, the present report draws the attention to issues of major importance for the further internationalisation of doctoral education at Norwegian higher education institutions.

Bergen, November 2011

Alf Rasmussen,

Director SIU

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1. Abstract and SIU's comments on the results

The internationalisation of PhD education is an important goal for Norwegian authorities of higher education and research. International mobility at the PhD level is an important part of this.[1] However, our knowledge about PhD mobility is very limited. In contrast to other levels of education, no mobility statistics are available at the PhD level. In the last ten years, only a few studies have been conducted on this topic.[2] Both the institutions and the authorities need more knowledge to pursue institutional and political goals. In 2010, the Norwegian Centre for International Cooperation in Higher Education (SIU) carried out a survey targeted at all PhD candidates at Norwegian higher education institutions (HEIs). The great majority of relevant institutions are included in the survey, and the response rate was about 40 per cent.

In addition to a number of background questions about the candidates, the survey included questions about accomplished and planned mobility, destinations for and character of mobility, and factors expected to influence the candidates' decision to be mobile or not.

Regarding the total numbers, our survey suggests that approximately 50 per cent of PhD candidates visit one or several foreign countries for study purposes during their PhD period. This figure is higher than the ones presented in the two previous reports from The Research Council of Norway (2002) and NIFU STEP (2007). At the same time, our figures include all kinds of international mobility, including short-term events like conferences and seminars. More specifically, the results indicate that a little more than 40 per cent go abroad for conferences, seminars and workshops, slightly more than one third of the candidates have research visits at foreign institutions while a little less than one of five candidates go abroad for purposes of data collection.

International mobility at the PhD level has been a political goal since the introduction of organised PhD education in the early 1990s, and increasing academic quality is the major rationale for increased mobility at the PhD level.[3] There are no specific goals regarding mobility, so it is not easy to conclude whether mobility is high or low. In the documents regulating PhD education, all institutions refer to "international" in some way or other. At the University of Stavanger, the PhD regulations explicitly state that candidates are normally expected to spend at least three months at a recognised institution abroad. The other institutions are less explicit. Some institutions emphasize that their goal is to educate researchers at a high international level. Other institutions explicitly require participation in an international research community, without linking this explicitly to mobility.

Our survey concludes that mobility rates differ with a number of characteristics, among them institutional affiliation. Considering that the University of Stavanger is unique in its explicit emphasis on mobility, it is not surprising that this university has the highest mobility rate among the institutions in the survey. At the same time, their institutional goals are apparently not yet met, as far from all UiS doctoral candidates are mobile.

Further, mobility rates vary significantly between the disciplines. In this respect, our survey is similar to those previously presented by the Research Council of Norway and NIFU STEP. Candidates within the humanities are most mobile – 71 per cent – while the lowest mobility rate is found in medical science with 26 per cent. In the social sciences and agricultural and fishery sciences, mobility is

[1] Report nr. 14 (2008-2009) to the Storting: 55.
[2] Norges forskningsråd: *Evaluering av norsk forskerutdanning,* 2002, and Svein Kyvik , Terje Bruen Olsen: *Doktorgradsutdanning og karrieremuligheter*. En undersøkelse blant to årskull doktorgradskandidater. NIFU STEP Rapport 35/2007.
[3] Report nr. 14 (2008-2009) to the Storting: 136.

relatively high (approx. 55 per cent) and mathematics and natural sciences represent the average with a little lower than 50 per cent. Technology is another relatively low mobility discipline, with figures slightly below 40 per cent. For political authorities as well as for institutions, the results should lead to a discussion whether particular efforts should be made to strengthen mobility in particular fields with low mobility.

Because of the considerable differences in mobility rates, it is difficult to make a general conclusion about the level of international mobility among doctoral candidates in Norway. Moreover, no specific target is set regarding the extent of mobility, which leaves us without a point of reference. At the institutional level, one should discuss the results and ask whether the mobility found is sufficient considering the goals set by the institution, taking into account the differences between subject fields. In order to take part in an international research community and to be exposed to, learn from and contribute to other academic communities, a certain level of mobility is essential.

Even though it is difficult to compare the results from our survey with the mentioned surveys from The Research Council of Norway and NIFU STEP, there are some indications that mobility rates are going down. The study from the Research Council of Norway concluded that 48 per cent of the candidates had stayed abroad for one month or longer. On the basis of our survey, we would estimate the figure to be between 35 and 40 per cent. The result seems to fit in well with NIFU's conclusion from 2007, which estimated approximately 40 per cent. We cannot conclude from the three studies alone, but this could indicate that the long-term mobility rate is going down. Given the political emphasis on increased mobility, this is disturbing. For both institutions and political authorities, it is important to pay attention to this and, if necessary, take action to change it.

As far as destination countries are concerned, the USA is clearly the single most important one. Of all internationally mobile candidates at Norwegian HEIs, approximately one third visits the USA during their doctoral period. The relative position of the USA as a destination country for PhD candidates from Norway is strong. Looking at destinations in terms of geographic regions, we nevertheless find that Europe is the most frequently visited region, with North America following close behind. At the other end of the list, we find South America, which is practically non-existent as a destination for mobile PhD candidates.

For most countries, mobility is higher within some academic discipline than others. For example, the UK seems to be relatively attractive for those working in the social sciences and much less attractive to those working in technology. For Germany and France, the opposite is the case. For the United States, no such pattern is found. According to our survey, in all academic disciplines approximately one third of all mobile candidates visit the USA.

While mobility rates differ markedly between fields of study, the report focuses on several other potentially distinctive factors as well, such as gender, age, responsibility for children, citizenship, etc. In particular, we ask to what extent can institutional arrangements and characteristics account for the quite significant differences in mobility at the various HEIs? Through bivariate cross-tabulation and a logistic regression model, we conclude that institutional arrangements seem to be an important factor when trying to explain differences in mobility rates.

The report also touches upon the issue of foreign PhD candidates at Norwegian HEIs. During the last one and a half decades, the share of foreign nationals has risen sharply. According to statistics, 28 per cent of all doctoral candidates who completed in 2010 were foreign citizens.[4] Among our respondents, the share of foreign citizens is considerably higher (37 per cent), indicating that the growth is continuing. From a demographic point of view, the foreign citizens differ significantly from

[4] NIFU Doctoral Degree Register. www.nifu.no

their Norwegian colleagues. They are younger, fewer of them are responsible for children, and there is a large male majority.

When we compare the country of origin of foreign nationals recruited to PhD positions in Norway with the list of destination countries for Norwegian PhD candidates, there is very little correlation. Among the five most important destination countries, only Germany is among the five most important countries for recruitment of doctoral candidates to Norway.

A final important conclusion from the survey is that PhD candidates who have been abroad for study purposes value the experience very positively. In particular, it seems that mobility experiences have a positive effect on motivation for continued research work, and they contribute to the development of the identity of the aspiring researchers as confident and active members of an international research community.

2. About the survey and the report

International mobility plays an important role in the internationalisation of higher education. At the bachelor's and master's degree levels, Norway has committed to the general goals formulated in the Bologna process, and separate goals are formulated on the basis of national policies of higher education. For these levels, mobility statistics are quite well-developed, and precise information is available as to the extent and destinations of mobility. At the PhD level, this is different. At present, there is no systematic reporting of mobility at this level, and consequently no national data available.

The present survey and analysis deal with two aspects: the extent and characteristics of mobility of PhD candidates at Norwegian higher education institutions (HEIs) and the question of motives and barriers for going abroad during their PhD period. The results of the report will provide useful information for both authorities of higher education and the HEIs. At both national and institutional levels, increased knowledge about the extent and characteristics of mobility will allow for the appropriate measures to be taken. The survey presents a picture of mobility at national as well as an institutional level, answering important questions such as: How many PhD candidates go abroad as a part of their doctoral studies, where do they go, what do they do, and for how long do they stay? What characterizes PhD mobility in the different academic disciplines, and what are the differences between institutions?

While addressing the extent and direction of mobility is an important goal in itself, the report does not stop there. Focusing on the differences between institutions regarding the extent of mobility, we have attempted to analyse as far as possible the significance of a variety of factors such as institutional affiliation, academic discipline, social background and obligations, etc. Moreover, we analyse the motives for and barriers to mobility as presented to us by the PhD candidates themselves. Differences between institutions are quite consistent throughout the analysis, and it is a main conclusion that institutional arrangements play an important role regarding the extent of mobility. This does not, however, necessarily imply institutions as such. Some of the results in our analysis suggest that differences in the organisation within a university may also lead to different mobility rates between various sections of that institution. We believe that that the results can be fruitfully followed up at the institutions in a discussion concerning the goals, strategies and the organisational framework for PhD mobility.

This report is based on a survey among PhD candidates at HEIs in Norway. According to statistics, there were a total of 8,897 registered PhD candidates at Norwegian HEIs in 2010.[5] SIU asked the relevant institutions for the e-mail addresses of their respective candidates, and received such information from the great majority of institutions. Among the institutions with more than 50 registered PhD candidates, the University of Agder, the University of Tromsø and the Norwegian School of Veterinary Sciences are not included in the survey. According to the statistics on higher education, the institutions covered in the survey have a total of approximately 7,900 PhD candidates. For some institutions, however, there is a significant discrepancy between e-mail addresses provided to SIU for the purpose of the survey and their total number of PhD candidates according to the statistics. This is particularly the case with the Norwegian University of Science and Technology (2,367 vs. 1,352) and the University of Oslo (2,824 vs. 2,295), while a more limited discrepancy is found at other institutions as well. In total, SIU received 5,932 individual and unique e-mail addresses from institutions. At NTNU, our selection is limited to holders of PhD scholarships, while the many individuals with a PhD contract but without a scholarship are not included. As a consequence, foreign nationals are overrepresented in the selection from NTNU. The more limited

[5] Norwegian Social Science Data Services (NSD), Database of Higher education. "Totalt antall doktorgradsavtaler".

discrepancy at the University of Oslo (UiO) stems from technical issues regarding time of registration, and this should not affect the representativeness of the sample.

In the period from 9 September to 22 October 2010, SIU sent e-mails with links to an on-line form to the selection of 5932 recipients. In the case of non-response, a reminder was sent seven days after the original mail. A total of 2432 individuals responded, which gives a response rate of 41 per cent. Regarding the representativeness of the total sample, we have compared with NIFU's PhD statistics looking at gender and field of study. From those perspectives, the response group is well-balanced and representative. On the other hand, it is possible that candidates with international experience are particularly prone to respond to a survey like this. A possible bias could influence on our assessment of mobility indicators in general, but it should not affect comparisons based on different characteristics such as institutional affiliation, fields of study, gender, etc.

The questions in the survey covered the following:

- background questions
- experienced and planned international mobility
- barriers and motives for mobility, and factors influencing the candidates' choice

The report is structured in three main sections. The first part presents the main findings from the survey. We approach the issue of the mobility rate of the response group from various angles, attempting to answer the following main questions: What is the mobility rate among the PhD candidates? What is the proportion of candidates who have been abroad in connection with their PhD studies, or who have specific plans for international mobility? What kinds of visits abroad do the PhD candidates have, mainly distinguishing between short-term activities such as conferences, seminars, and workshops, collection of data in a foreign environment, and research visits at foreign institutions. Finally, in the first section we have a look at the main destinations, discussing differences between the various academic disciplines regarding where the candidates go.

The second part focuses on the institutional perspective, stating that mobility rates differ significantly between institutions. At the same time, differences are found when approaching mobility from the perspective of academic disciplines, personal background factors, or other angles. This part of the report looks at mobility rates, taking a variety of factors into the consideration. For the purposes of this report, it is particularly important to single out the impact of institutional affiliation on mobility rates. Using a logistic regression analysis, we discuss the importance of the highlighted factors, concluding that institutional affiliation remains crucial.

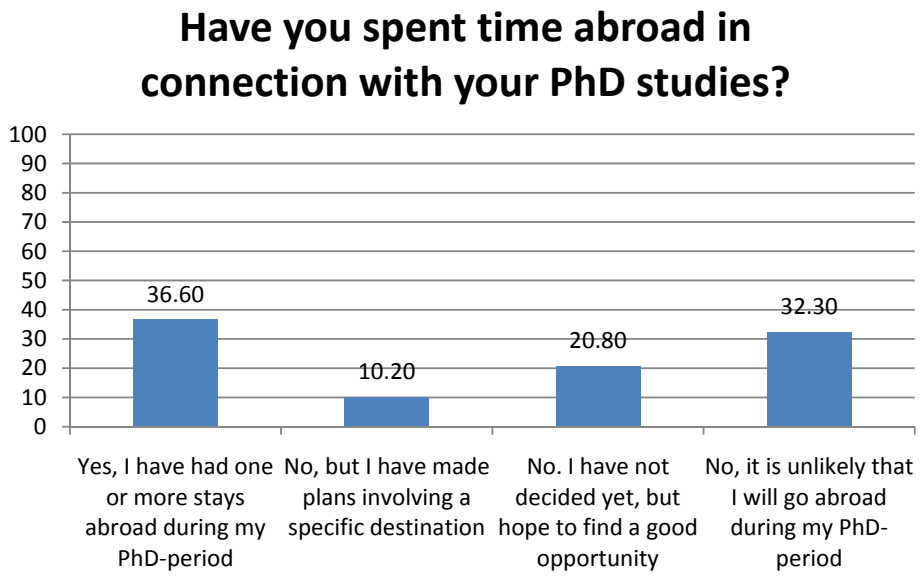
Having focused on mobility rates and various background factors, the report draws attention towards the subjective perspective of the candidates. What do the candidates themselves see as the most important factors when they make their individual choices regarding mobility, and to what extent do the results to these questions fit in with the conclusions of the previous analysis?

While the two first sections deal with international mobility from the point of view of candidates leaving Norway for study purposes, the final section deals with PhD candidates with foreign citizenship at Norwegian HEIs. Regarding this group of PhD candidates, statistics are available regarding institutional affiliation, academic discipline and regional background. We will develop the picture further, focusing on other characteristics of the foreign PhD candidates in Norway.

3. Main findings

Estimating the extent of international mobility was one major goal for our survey. The following was therefore a key question: "Have you spent time abroad in connection with your PhD studies?" The respondents were given four alternatives, and figure 1 shows the response for the entire selection. While 36.6 per cent responded that they had been abroad, 10.2 per cent replied that they had made plans involving a specific institution. 20.8 per cent responded that they had not decided yet but hoped to find a good opportunity, while 32.3 considered it unlikely that they would go abroad during the PhD period.

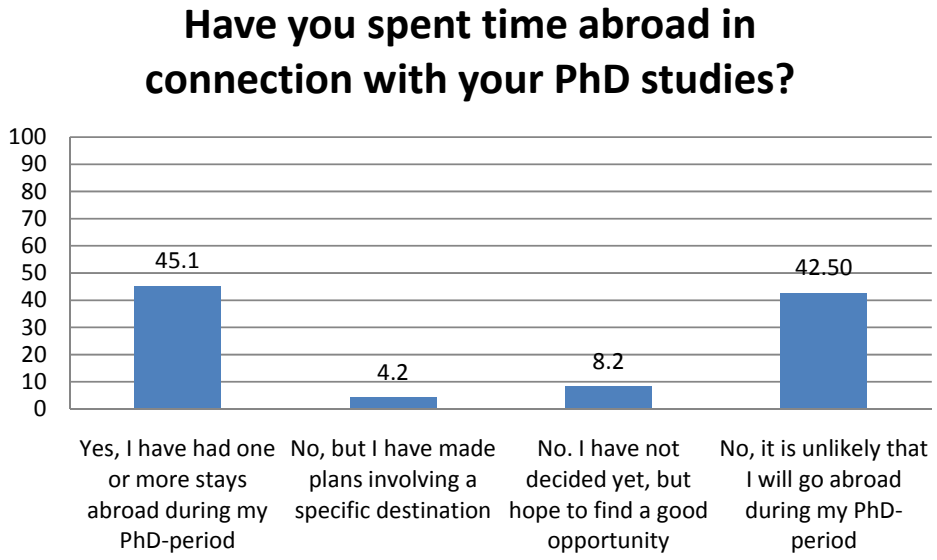
Fig. 1. Mobility rate. Selection: all respondents. N=2483.



This general question covers all kinds of mobility, from short conferences to long-term research visits or other long-term stays in foreign countries. Later in the report, we will differentiate according to type and duration of stays abroad, but at this point, we use the broad definition in order to cover all kinds of international mobility.

The figures above include responses from all PhD candidates, those in the beginning of the PhD period as well as those who are close to finishing. In order to determine the level of mobility during the PhD period, it would perhaps be best to ask PhD candidates upon completion. Due to missing contact information, this is not possible. Instead, we single out the response from candidates in their third year or later. This will give us a better estimate of the degree of mobility among PhD candidates, and many of the analyses in this report will be based on that selection of respondents. As should be expected, the mobility rate increases significantly when using that selection (figure 2).

Fig. 2. Mobility rate. Selection: respondents in 3rd year or more of the PhD period. N=1281.

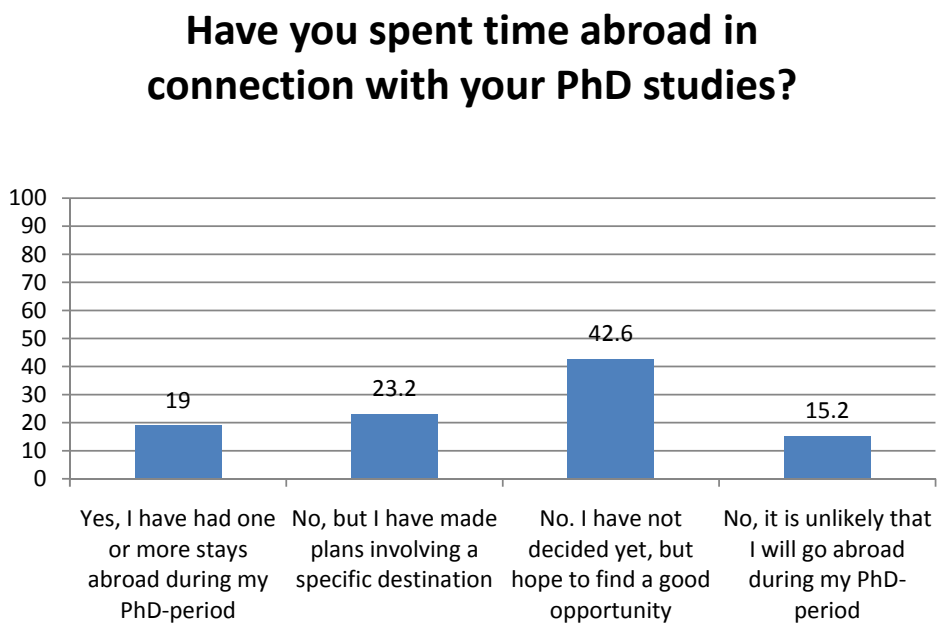


When focusing on candidates towards the end of the PhD period, we logically find that most candidates either have been abroad or find it unlikely that they will go abroad during the remainder of the period. Few in this selection have specific plans for mobility or hope to find a good possibility. The results in figure 2 indicate that slightly less than 50 per cent of candidates will have had some kind of international mobility during their PhD period. Considering that the figure includes conferences and workshops abroad as well as research visits and data collection, this seems low. It is possible that some respondents without other stays abroad besides conferences or workshops have misunderstood the question and failed to indicate this as mobility in the survey. However, for 22 per cent of those who have taken part in conferences or seminars abroad, this is their only type of mobility. Probably, the figures regarding participation in conferences and seminars abroad should be read with some caution, while this uncertainty does not apply to the other kinds of mobility.

PhD candidates are positive to mobility

If we compare the response from first year candidates with that of candidates in the third, fourth or fifth year, an interesting observation can be made. While the overall results indicate that less than 50 per cent of PhD candidates are mobile during the PhD period, the great majority has a positive attitude towards international mobility at the outset.

Fig. 3. Mobility rate. Selection: respondents in their first year of the PhD period.



Only 15 per cent of the candidates in the first year of the PhD period state that it is unlikely that they will go abroad. The remaining 85 per cent of the first year respondents either have been abroad, plan to go abroad or – in most cases – hope to find a good opportunity. On the basis of the survey, we cannot identify the reasons for the discrepancy between the attitudes and expectations of the first year candidates and the actual mobility pattern. However, the results indicate that the potential for mobility is greater than what is actually achieved at the higher education institutions.

Types of mobility

The main question above did not specify the kind of stay abroad. However, candidates who responded that they had been abroad were asked to specify the duration and type of stay(s) abroad.

Table 1. PhD candidates 2010. Types of stays abroad. Selection: Candidates in the 3rd year or more of the PhD period. Per cent.*	
Conference, workshop, seminar	40*
Data collection	16
Research visit at foreign institution	32
Other	6

While participation in conferences, workshops, or seminars typically lasts for up to one or maximum two weeks, the duration of data collection and research visits may extend from one or a few weeks to more than a year. On the basis of the results from the survey, we would estimate that approximately 35-40 per cent of the PhD candidates have research-related stays abroad of one month's duration or more. We will look closer at the issue of duration of stays in the section where we focus on characteristics of mobility at the different institutions.

Destinations and academic disciplines

Among the destination countries, we find, not surprisingly, that the USA is particularly important for the PhD candidates at Norwegian institutions. Second on the list of countries is the UK. A considerable percentage of the candidates who have been abroad as PhD candidates, has visited more than one country. In table 2, all mobility is counted, whether as sole destination, most important destination or as second-most important destination. We shall later see that the picture changes somewhat when we distinguish between main and second destinations, but the USA remains a number one destination. According to our survey, about a third of all mobile candidates visit the USA during their PhD period, which represents approximately 14 per cent of all PhD candidates. As we have asked candidates in their final phase of the period, but not candidates who have completed, there is reason to assume that the actual figures are a little higher than our results.

Following the USA and United Kingdom, we find Denmark and Sweden, which indicates that the neighbouring Scandinavian countries play significant roles as destination countries for Norwegian PhD candidates.

At other levels of education, statistics are available regarding annual mobility. On the background of our survey, it is not possible to conclude about annual figures. However, we have included in table 2[6] an estimate of how many individuals within the current PhD population that are likely to visit the different countries, based on the frequencies found in our survey. Slightly lower than the mobility to Sweden is the mobility to Germany and France. Considerably more limited is the mobility to the next countries on the list, including Canada, the Netherlands, Spain, China, Italy, and Finland.

[6] Table 2 lists the most important destinations. The appendix includes a full list of destination countries.

Table 2. Destination countries for PhD candidates. In per cent of all respondents and mobile respondents and estimated total number.
Selection: Candidates in the 3rd year or more with the given country as the only destination, main destination, or second most important destination. Per cent and estimate.

	Share of all respondents, per cent	Share of mobile respondents, per cent	Estimated total number of PhD candidates**
United States	14.3	32.9	1270
United Kingdom	6.6	15.3	590
Denmark	5.8	13.3	510
Sweden	4.4	10.3	400
Germany	4.3	9.9	380
France	3.5	8.1	310
Canada	2.0	4.7	180
Netherlands	2.0	4.5	170
Spain	1.9	4.3	170
China	1.7	4.0	150
Italy	1.7	4.0	150
Finland	1.6	3.8	150
Australia	1.2	2.9	110
Switzerland	1.2	2.9	110
Japan	1.1	2.5	100
Austria	0.9	2.2	80
Belgium	0.8	1.8	70
South Africa	0.8	1.8	70
Tanzania	0.8	1.8	70
Portugal	0.6	1.4	60
Uganda	0.6	1.4	60

** Estimate of how many PhD candidates who visit the respective countries during their PhD period based on the total number of registered PhD candidates in 2010 (8897).
* Figures too low to allow for estimate

In table 2b, we have organised destination countries into regions. We have limited the selection to the countries listed by the candidates as the “only” or “main destination”. Consequently, figures are lower than those in table 2 above.

Table 2b. Main destination countries grouped in regions. Selection: Candidates in the 3rd year or more with the given country as the only or main destination.		
	Mobile respondents	**Share of candidates. Per cent**
Europe other than Nordic countries*	197	15.4
North America	157	12.3
Nordic countries	82	6.4
Asia **	52	4.1
Africa	34	2.7
Latin America	6	0.5
* incl. all of Russia		

Looking at regions, we find that Europe, not including the Nordic countries, is the most important region, slightly ahead of the Unites States. It must be emphasized, however, that one third of the mobility to Europe is mobility to the UK. The neighbouring Nordic countries remain relatively important destinations for mobile PhD candidates. From a perspective of continents, the most striking result is the near-absence of mobility to Latin America. Considering the Norwegian policy towards several countries in the region, this should be brought to the attention of the authorities of research and higher education.

If we look at mobility patterns and destination countries for bachelor's and master's degree students, we find both similarities and significant differences (table 3). For bachelor's and master's degree exchange students too, the USA is the number one destination, and the UK is an important destination as well. Australia, on the other hand, has long been a major destination for students from Norway at bachelor's and master's levels, while it has limited importance as a destination for PhD candidates. This highlights that there are some important differences between mobility for PhD candidates and mobility for other students. As we will return to later in the report, PhD mobility is characterized by a research-related motivation; motives for mobility at other levels are more multi-faceted.[7]

[7] SIU. Mobilitetsanalyse 2009. www.siu.no
http://www.siu.no/nor/Politikk-og-strategi/Mobilitet/Mobilitetsanalysen

Table 3. The 15 most important destination countries for exchange students from Norwegian HEI's 2009/10. Total numbers and as percentage of exchange students to the 15 countries.		
	Number of mobile students	**As per cent of students in table**
USA	1080	22
Australia	768	16
UK	507	10
Tanzania	362	7.4
South Africa	278	5.7
France	270	5.5
Denmark	251	5.1
Germany	241	4.9
Spain	235	4.8
China	181	3.7
Canada	173	3.5
Namibia	137	2.8
Russia	134	2.7
India	131	2.7
Japan	129	2.6
Source: SIU Report on Mobility2010.		

Another striking difference is the position of Tanzania and South Africa on the list of exchange student mobility. While very limited as a PhD destination, student mobility at master's and bachelor's levels to the two countries is significant. This reflects the long and strong tradition in Norway for cooperation with African countries and other countries in the south, often in a framework of capacity building and combining higher education and research. However, the mobile PhD candidates in Norway appear to prefer other destinations when going abroad for study purposes.

Regarding the PhD candidates, different academic disciplines have different mobility patterns. However, for all academic disciplines, the USA is clearly the single most important destination. Our survey shows (table 4) that approximately a third (30-36 per cent) of mobile candidates has visited the country for study purposes. While the USA is a major destination across disciplines, in other cases, interdisciplinary differences appear. To the UK, mobility is particularly high within the social sciences followed by the humanities, and relatively low within technology and medicine, in particular. Germany and France as destinations are relatively more important in mathematics and natural sciences, technology, and humanities. Sweden appears to be a particularly important destination within medicine, while Denmark appears to be more important for candidates within the humanities and the social sciences. A striking result of the survey is that mobility to an important country such as Canada, appears to be virtually non-existent within the humanities.

Table 4. Destination countries for PhD candidates according to academic disciplines. Selection: Candidates in the 3rd year or more with the given country as the only destination or - for candidates with visits to more than one country – the main destination. Per cent

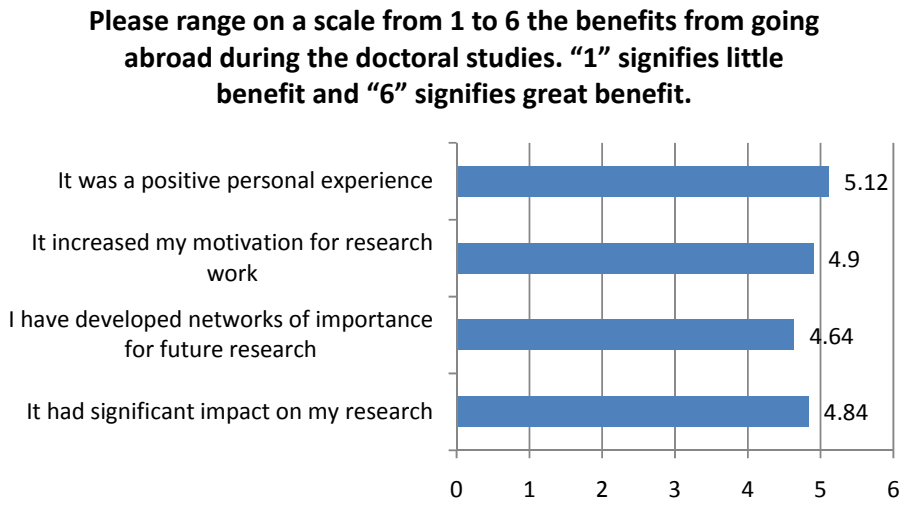
	Hum.		Soc. sc		Math-Nat		Tech.		Med.	
	Of all	Of mobile	Of all	Of mobile	Of all	Of mobile	Of all	Of mobile	Of all	Of mobile
USA	22	30	18	34	15	33	13	34	9	36
UK	13	18	13	24	6.6	15	2.9	7.7	2.2	8.7
Denmark	14	19	8.7	17	5.0	11	3.3	8.8	2.9	11.6
Sweden	7.3	10	4.3	8.3	3.6	8.0	4.1	11	4.3	17.4
Germany	8.3	11	3.0	5.7	5.9	15	4.9	13	1.1	4.3
France	8.3	11	1.7	3.2	5.0	11	4.5	12	1.1	4.3
Canada	0	0	1.7	3.2	2.3	5.1	2.0	5.5	1.8	7.2
China	1.8	2.5	2.0	3.8	1.3	2.9	2.5	6.6	1.1	4.3
Spain	0.9	1.3	2.0	3.8	1.7	3.6	2.9	7.7	1.4	5.8
Italy	3.7	5.1	1.0	1.9	2.3	5.1	2.0	5.5	0.7	2.9

Looking more closely at table 4, we find that the list of main destination countries is not identical with the one presented in table 3. The reason is that in table 4, we chose to include only mobility to the countries selected by the candidates as the "main destination" in order to highlight the geographic profile of the various disciplines. The result is that some countries change places, and in particular, the Netherlands appear to be a "number two" country for PhD candidates. Table 4 also reveals that mobility differs considerably between the disciplines. We will return to this issue in the next section.

Benefits of international experience

Having looked at the extent of mobility, we now draw attention towards what is in many ways the crucial question: What benefit do the PhD candidates have from their shorter or longer stays abroad in connection with their PhD studies? In the survey, the PhD candidates were asked what benefits they had experienced in different areas.

Fig. 4. Stays abroad. Experienced benefits.



The results (figure 4) indicate that PhD candidates on a general level are very satisfied with their international experiences as PhD candidates. As a general result, this is true for candidates in all fields and from all Norwegian institutions. In particular, the candidates favoured the response alternative "It was a positive personal experience". The content of this phrase was not further defined in the survey. However, we find it reasonable to assume that the positive score reflects a general satisfaction with the stay abroad, as well as the candidates' positive experience in the role of aspiring researchers in an international academic community. In this light, it is not surprising that the response alternative "it increased my motivation for research work" received the second highest score. When it comes to the impact on the actual research for the PhD degree, there are some moderate differences between the academic disciplines. Candidates in medical studies and mathematical and natural sciences tend to emphasize this aspect a little less than the candidates from other fields of study. At the same time, they are no less positive regarding the overall experience and the effect on motivation for continued research. Among the four response alternatives offered, the average candidate put the least emphasis on the significance for "networks of importance for further research". However, with an average response of 4.64 on a scale from 1 (little benefit) to 6 (great benefit), we can conclude that the candidates consider the creation of new networks to be a positive effect as well.

Our results clearly indicate that PhD candidates who go abroad see this as a highly valuable contribution to their doctoral studies. We failed to find any major difference between institutions or academic disciplines. Instead, results were quite similar throughout the groups of respondents. While clearly important for building networks and for the PhD research project as such, the main and most important effects of the PhD candidates' international experiences appear to be found elsewhere. First and foremost, our results suggest that international experience is a very positive contribution in the development of the self-image and identity of the candidates as researchers in a wider international community. Mobility at levels of education is often connected to goals of socialisation into an international or global community. International PhD mobility appears to contribute positively to the socialisation of the candidates into an international academic and scholarly community, resulting in increased motivation for continued research work once the PhD degree is completed.

Our conclusion is not to say that one should reduce focus on the content and quality of mobility. Obviously, those must always remain essential concerns. At the same time, it seems that

international experience has some positive effects in itself, which should not be underestimated at institutions when discussing how to develop their PhD candidates into confident and highly motivated researchers eager to find their place in an international research environment.

4. PhD mobility at different institutions

In the following, we will look at mobility from the perspective of institutions. We will examine the institutional differences in the mobility of PhD candidates. For reasons discussed above, we only include respondents who are in their third, fourth or fifth year of their PhD period. Table 5 in the appendix clearly shows that several of the Norwegian HEIs are represented in our sample by a very limited number of PhD candidates, often too few to conduct a robust analysis. To reduce the scope for incorrect conclusions due to problems of non-response bias, we have decided to "lump together" all the institutions with fewer than 50 candidates, and focus primarily on the six institutions shown in table 6 in the appendix. Among these six institutions, the number of respondents from NHH, the University of Stavanger and the Norwegian University of Life Sciences is quite small. Hence, caution should be taken when interpreting the results from these institutions.

Table 7: Mobility rate, detailed. By learning institution. 2010. Per cent and N

	Have you spent time abroad in connection with your PhD studies?				
	Yes, I have had one or more stays abroad during my PhD period. %	No, but I have made plans involving a specific destination. %	No. I have not decided yet, but hope to find a good opportunity. %	No, it is unlikely that I will go abroad during my PhD period. %	N
Norwegian University of Life Sciences (UMB)	52.5	3.8	11.3	32.5	80
Norwegian University of Science and Technology (NTNU)	42.7	6.4	10.2	40.7	344
University of Bergen (UiB)	50.0	5.0	5.0	40.0	240
University of Oslo (UiO)	41.7	3.2	7.3	47.8	441
University of Stavanger (UiS)	62.5	1.8	3.6	32.1	56
NHH	44.1	.0	5.9	50.0	34
Other tertiary learning institution	40.7	2.3	15.1	41.9	86
Total	45.1	4.2	8.2	42.5	1281

In table 7, we find clear variations between institutions in their PhD candidates' propensity to spend time abroad in connection with their PhD studies. Whereas only slightly more than 40 percent of the candidates at NTNU, NHH and UiO have spent time abroad, more than 60 per cent of the candidates at UiS and about half of the candidates at UiB and UMB have done so. This pattern does not change much if we also include those with plans to go abroad involving a specific destination. However, we do find a somewhat different situation if we look at those students who state that it is unlikely that they will go abroad during their PhD period. UiS and UMB remain the institutions where the candidates seem less prone to consider it unlikely that they will spend time abroad, but NTNU is now on par with UiB.

The number and duration of stays vary within the group of candidates who have spent time abroad in connection with their PhD studies. In table 8, we find that close to half of these candidates had one or two stays abroad. There are, however, quite a few candidates, about one fourth, who have had more than five stays abroad. The latter seems particularly common amongst candidates at UiB and UiO.

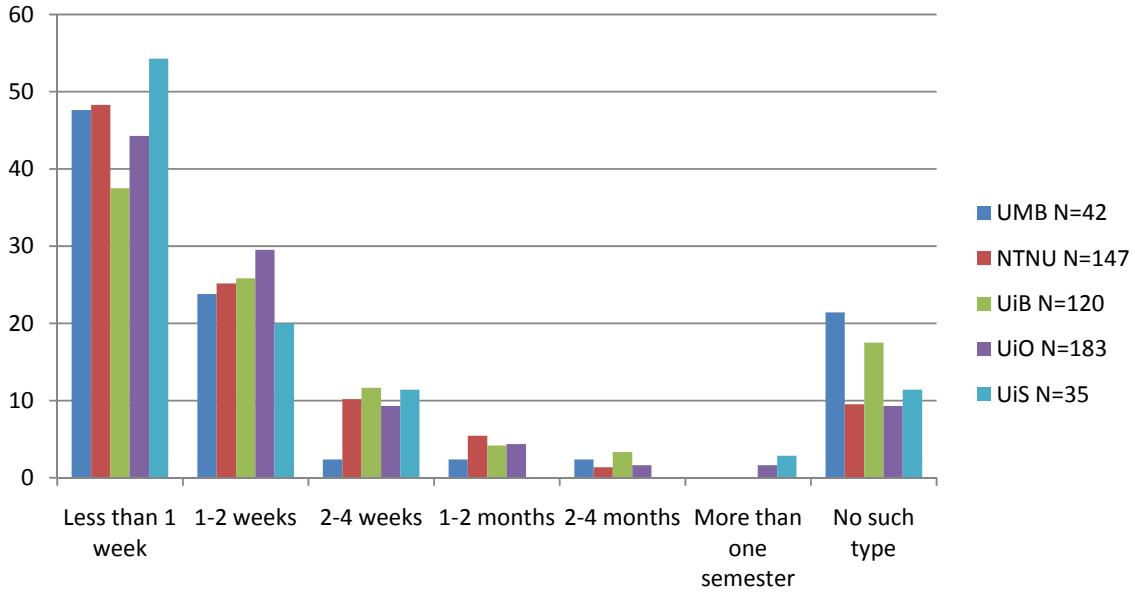
Table 8: Number of stays abroad as a PhD candidate among mobile candidates. By learning institution. 2010. Per cent and N.

	One stay. %	Two stays. %	Three stays. %	Four stays. %	Five stays. %	More than five stays. %	N
Norwegian University of Life Sciences (UMB)	28.6	14.3	23.8	11.9	2.4	19.0	42
Norwegian University of Science and Technology (NTNU)	33.3	17.7	15.6	10.9	2.7	19.7	147
University of Bergen (UiB)	30.8	21.7	10.8	6.7	3.3	26.7	120
University of Oslo (UiO)	23.4	17.9	11.4	12.0	6.0	28.8	184
University of Stavanger (UiS)	28.6	17.1	14.3	20.0	5.7	14.3	35
NHH	33.3	13.3	20.0	13.3	13.3	6.7	15
Other tertiary learning institution	14.3	17.1	17.1	20.0	5.7	25.7	35
Total	27.9	18.2	14.0	11.6	4.5	23.7	578

Type and duration of stays abroad

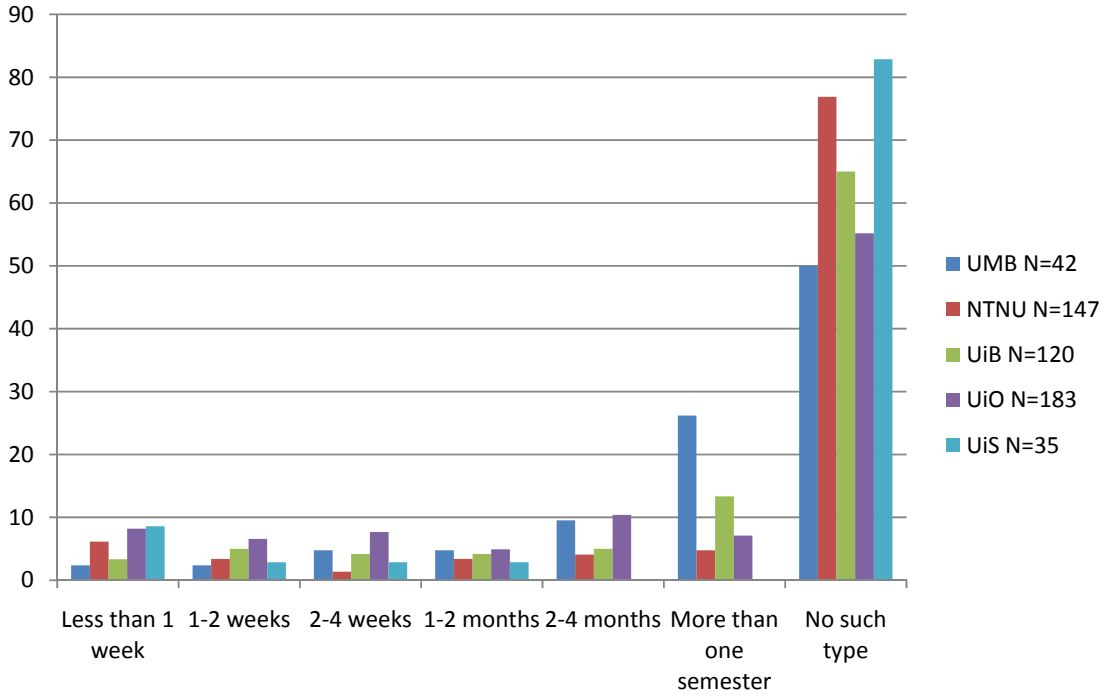
The survey also covers the duration and type of stay those candidates going abroad have had. Some respondents have reported having had stays of various durations for each type, but in the figures 5-7, we only consider their longest reported duration for each type.

Fig. 5: Type and duration, stays abroad: Conference, workshop, seminar. By learning institution. 2010. Per cent



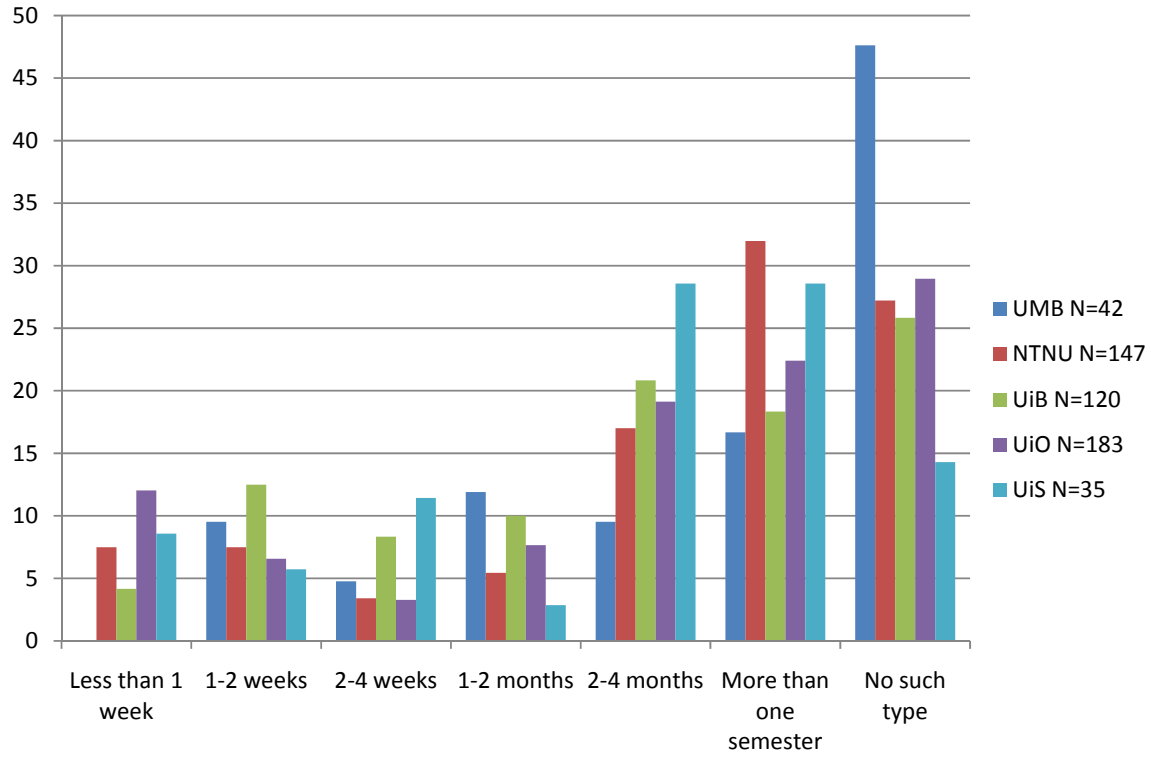
Conferences, workshops and seminars are by far the most common type of stay abroad, and they typically have a short duration of two weeks or less. Conferences, etc., seem somewhat less common among candidates at UMB. However, this is only the case for stays with a duration of more than two weeks.

Fig. 6. Type and duration of stays abroad: Data collection. By learning institution. Per cent.



The situation is reversed if we look at stays abroad for the purpose of data collection. Such stays are more prevalent at UMB, and compared with the other institutions, longer data collection stays are also quite common at UMB. About half of the PhD candidates from UMB report to have had data collection stays abroad, more than twice the percentage reported by candidates at NTNU or UiS. UiO also has a rather high number, 45 per cent, who report to have had stays abroad for the main purpose of data collection.

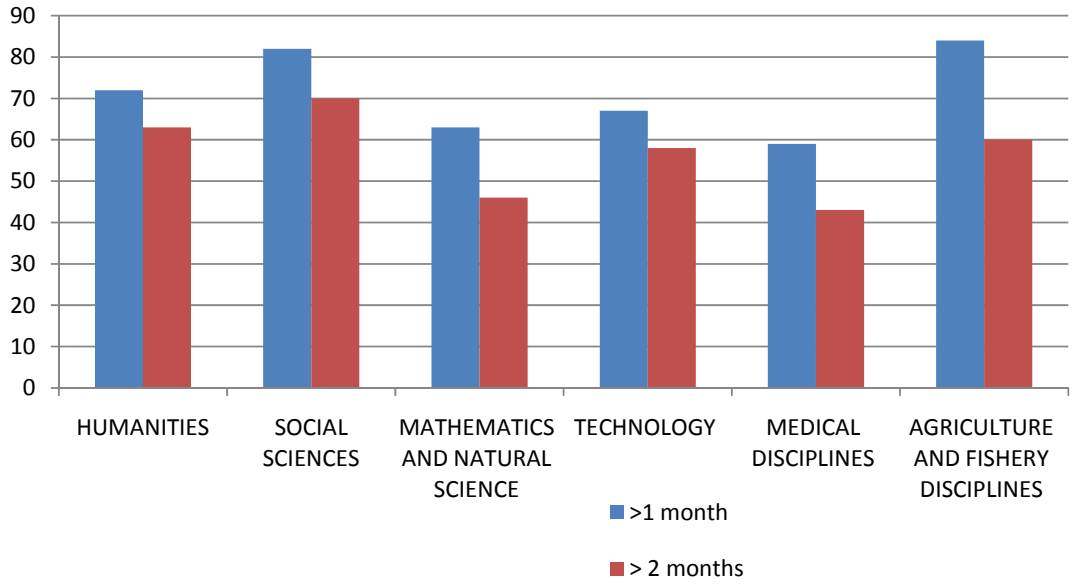
Fig. 7 Type and duration stays abroad: Research visits at foreign institution. Per cent.



Research visits seem more common than data collection stays, and typically have a rather long duration. Fifty per cent of all candidates who have been abroad report to have had a research visit lasting one month or more. Such visits seem more common at UiS than the other institutions, in particular, compared with UMB.

Regarding the duration of research visits to foreign institutions, we find some differences between the subject fields (fig. 8). There is a tendency that when candidates in the social sciences, the humanities, agriculture and fisheries go abroad for research visits at foreign institutions, they typically stay longer than candidates in the other subject fields. As we will see later, however, these differences are much smaller than the differences in overall mobility rates.

Fig. 8. Duration of research stays at foreign institution. Share of candidates with stays of more that 1 and 2 months duration. By field of study. Percent



Candidate profiles and mobility rates

Institutional differences in PhD mobility may reflect institutional arrangements, mobility efforts or policy, but the differences in mobility rates may also primarily be a result of variations in the PhD candidate population across institutions. Do the institutions themselves matter when we control for characteristics such as gender, age, citizenship, responsibility for children, etc? To examine this further, we will first present simple bivariate figures that show the mobility rates according to such characteristics. We will then present results from a multivariate binary logistic analysis that includes these individual characteristics as well as dummy variables for each of the six learning institutions.

Fig. 9. Share of male and female PhD candidates with stay(s) abroad.

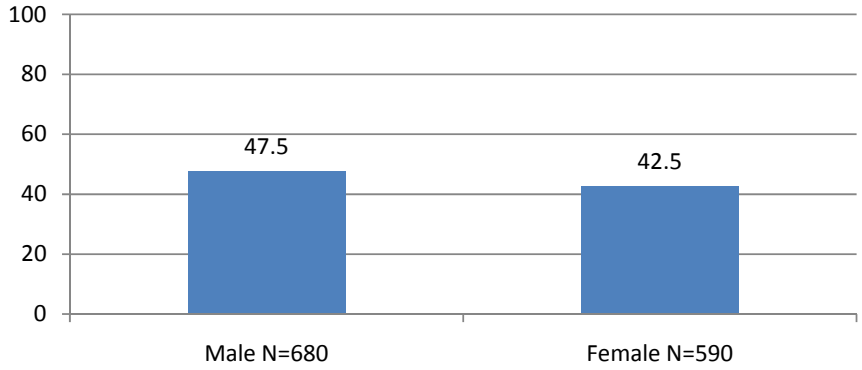


Fig. 10. Share of mobile PhD candidates in different age groups. Percent. N= 1279

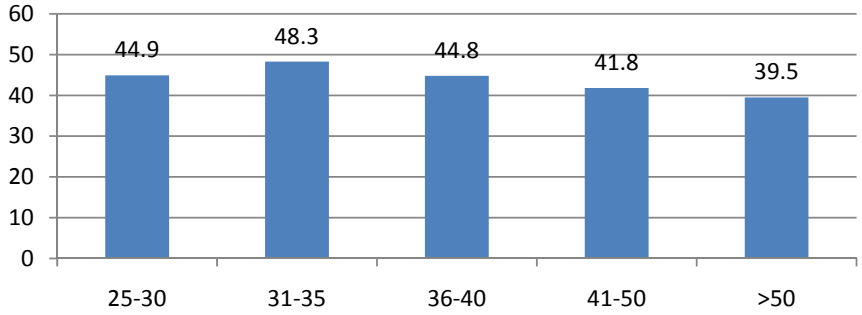


Figure 9 shows that there is only a limited gender difference in the PhD mobility rate, with male students being slightly more mobile than female students. There is also not a marked impact of age on PhD mobility. Figure 10 indicates that candidates over 50 years old are somewhat less mobile than others, and that the mobility rate is highest in the age group 31-35 years, but the gap is not statistically significant at a 5 per cent level. The importance of having children also seems limited. However, as we will discuss further when we look at obstacles to mobility, the result in figure 11 might hide a more complex picture.

Fig. 11. Mobility rate. By responsibility for children under the age of 18. Percent.

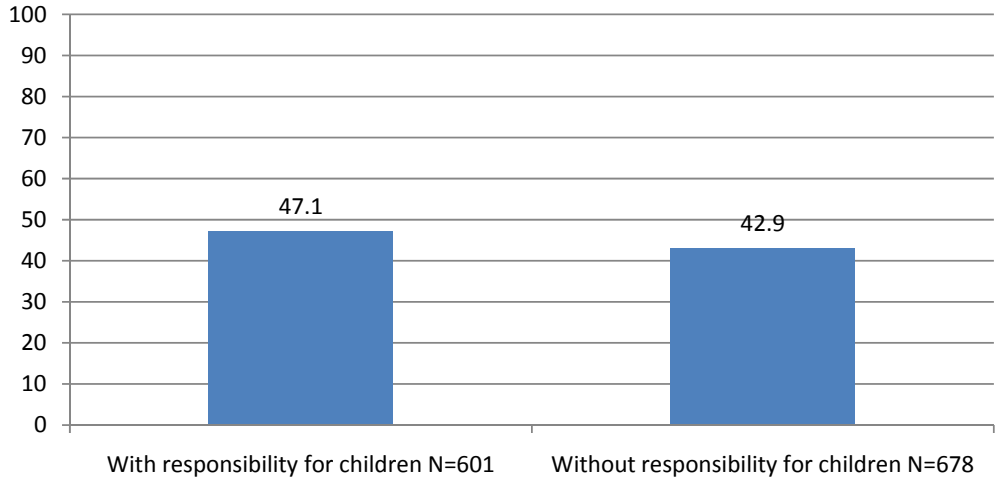


Figure 12 shows that the mobility rate among non-Norwegian citizens is about 8 percentage points higher than that of Norwegian citizens. This gap is also statistically significant.

Fig. 12. Mobility rate. By citizenship. Percent.

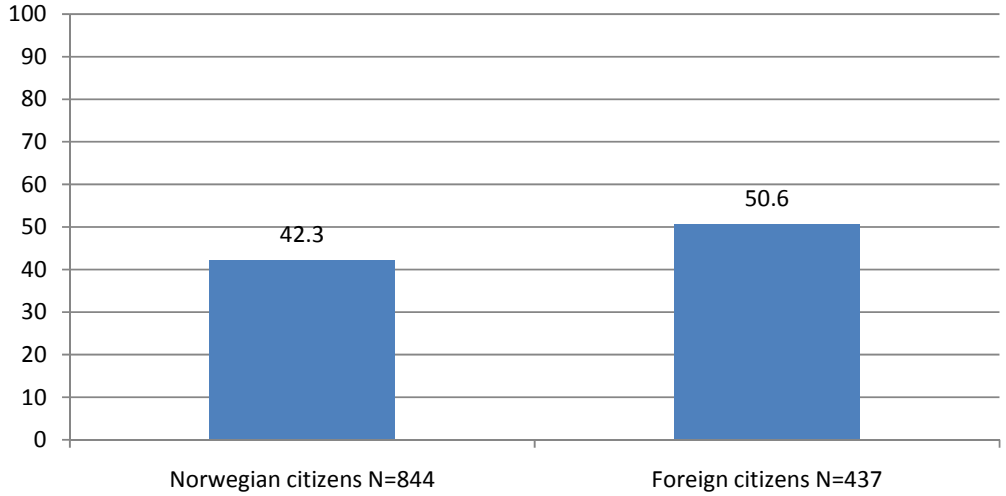
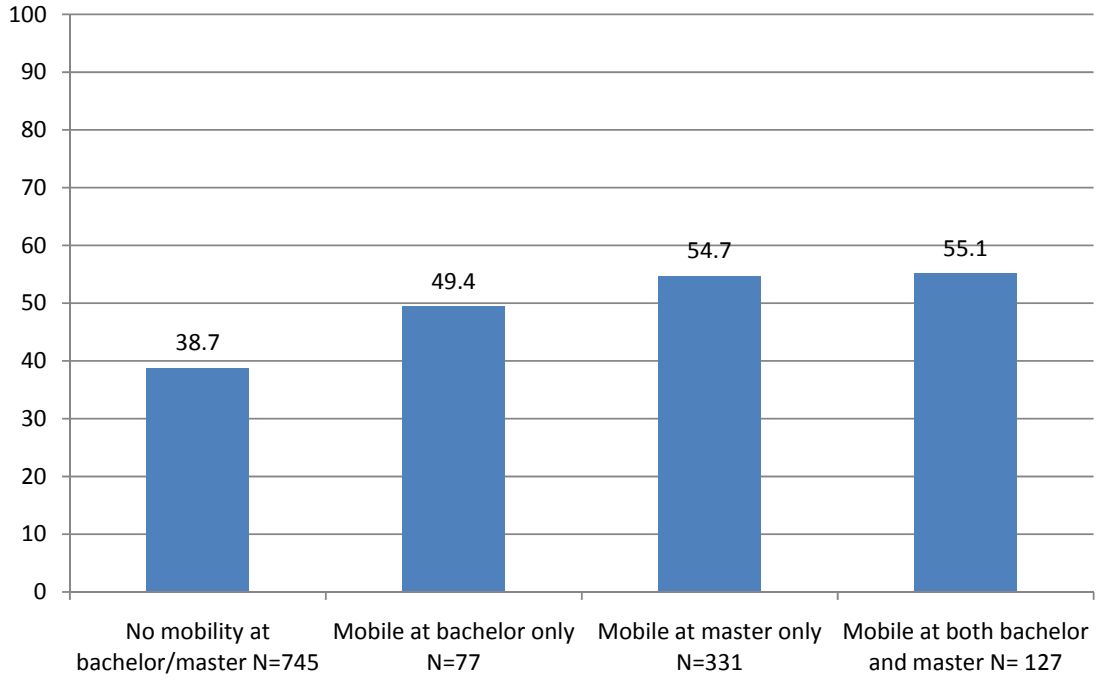


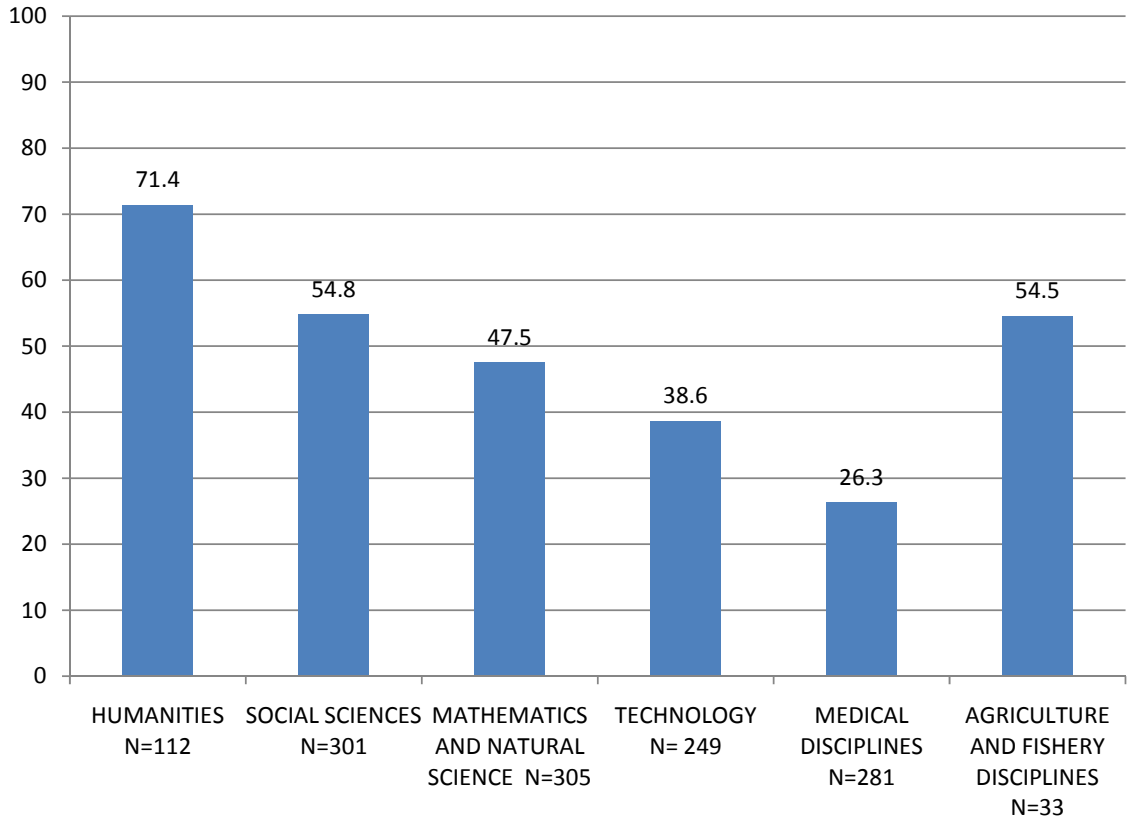
Fig. 13. Mobility rate. By stays abroad in connection with previous studies. Percent.



According to figure 13, there is a positive link between stays abroad in connection with previous studies and the likelihood to have stays abroad during the PhD studies as well. This is not surprising. For example, it may be easier to organise a research visit abroad if an individual has connections with that institution from previous studies, and previous studies might reduce real or perceived language barriers. Between those who have had previous stays abroad, there is not a significant difference according to the level of study. However, those who only had stays abroad at the Bachelor's/undergraduate level seem to have a slightly lower PhD mobility rate than those with stays abroad during their Master's/graduate or both levels.

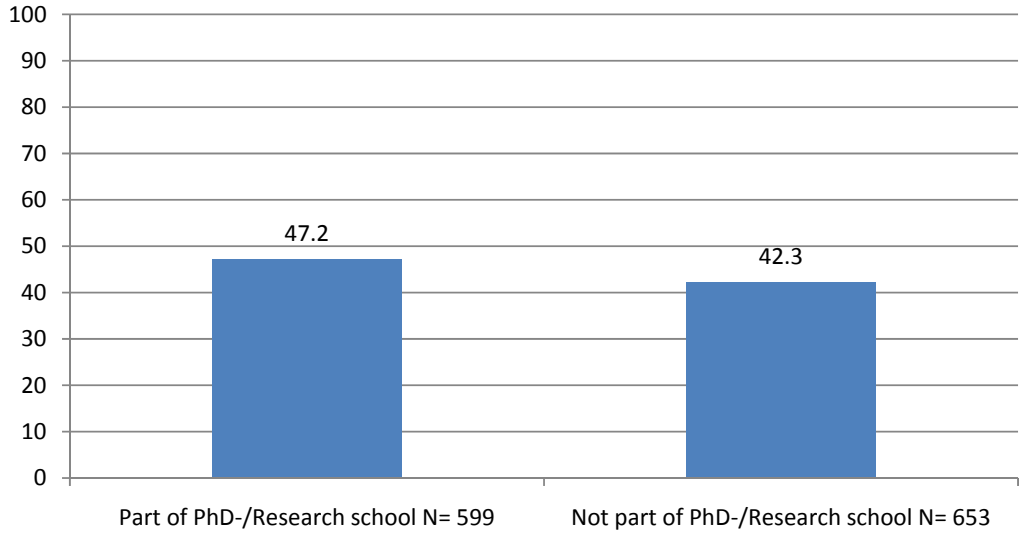
In figure 14, we look at characteristics that might be seen as more closely linked to the nature of the learning institution at which the PhD candidates work: the discipline or field of study. This figure reveals considerable differences between disciplines with regards to mobility rate. Stays abroad are particularly common in connection with PhD studies in "Humanities" and least common in fields such as "Technology" and "Medical disciplines". Regarding the medical disciplines, the organisation of PhD studies explains the particularly low mobility. These PhD candidates are often engaged in clinical work as well, which results in less flexibility than what the PhD candidates in other disciplines enjoy.

Fig. 14. Mobility rate. By field of study. Percent.



In our final bivariate cross-tabulation, we look at the mobility rate in light of the organisation of PhD studies. Among the candidates in the current selection (candidates in the third year or more), slightly less than half (48 per cent) responds that they are a part of a PhD research school / graduate school.

Fig. 15. Mobility rate. By organisation of PhD studies. Percent.



From the figures above, we see that mobility rates vary with a number of factors. A binary logistic regression analysis was carried out in order to shed more light on the significance of the different factors. The analysis is presented in Appendix 1.

The results of the logistic regression analysis underpin much of what we have found in our previous cross-tabulations. Of particular importance to the focus of this chapter, we find that the institutional variable remains significant after we control for other characteristics. This indicates that the institutional differences in mobility rates should not merely be attributed to variations in the PhD candidate population across institutions. It is, however, important to note that there are also likely to be other relevant characteristics of the PhD candidates (e.g. marks, income, etc.) not included in our model due to lack of data. We also note that there is some change in the institutional pattern. When we control for gender, age, field of study, etc., the results indicate that NTNU has a mobility rate at about the same level as the University of Bergen, whereas NHH has a significantly lower mobility rate than the other large learning institutions.

When we control for the other variables in our regression model, age and child dependency do not have a statistically significant effect on mobility, unlike all the other variables. In line with the bivariate results, male candidates have a higher probability of having PhD stays abroad than female candidates, Norwegian citizens are somewhat less mobile than foreign citizens, previous studies abroad have a positive effect on mobility, and finally, candidates in “Technology” and “Medical disciplines” are less mobile, and candidates in the “Humanities” are significantly more mobile than other candidates.

The fact that institutional arrangements do seem to matter is further supported by table 9. Although a majority of those who have been abroad report that the decision to do so was largely a result of their own initiative, it is worth noticing that “institutional arrangements” is mentioned rather often by candidates at the two institutions with the highest mobility rates: UMB and UiS.

Table 9: Q21 "The decision to go abroad in connection with the PhD studies was largely a result of…". By learning institution. 2010. N and percent				
	My own initiative. %	**The initiative of my supervisor . %**	**Institutional arrangements. %**	**N**
Norwegian University of Life Sciences (UMB)	52.4	26.2	21.4	42
Norwegian University of Science and Technology (NTNU)	61.9	33.3	4.8	147
University of Bergen (UiB)	65.8	26.7	7.5	120
University of Oslo (UiO)	60.3	30.4	9.2	184
University of Stavanger (UiS)	67.6	8.8	23.5	34
NHH	80.0	13.3	6.7	15
Other tertiary learning institution	77.1	11.4	11.4	35
Total	63.3	27.2	9.5	577

Motives and barriers

There are likely to be many factors that play a part in a decision to go abroad during the PhD study period. Question 25 of the survey lists a range of different factors, and asks those who have been abroad, have plans, or hope to go abroad, to rate the importance of each factor on a scale from 1-6. The mean scores of these factors by institution are shown in table 10 (see appendix). However, to simplify the analysis of these results, we have created a set of index variables. The indexes are based on a judgment of which factors it seems reasonable to consider as part of the same underlying "dimension". The mean scores on the resulting four dimensions are presented in table 11 (the category "4. Family/partner abroad" and "10. Participation in courses not offered by home institution" didn't correlate well with any of these dimensions, and must be discussed separately). The four dimensions are "Personal development and language" (categories 1-2 in Q25), "Career and network" (categories 3, 5, 7, 9 in Q25), "Research facilitated" (categories 5, 6, 8 in Q25) and "Institutional factors in Norway" (categories 11-14).

The first two dimensions are clearly the most important ones, and the last one, "Institutional factors in Norway", seems to be the least important of the four dimensions when it comes to deciding whether to go abroad or not. However, it is interesting to note that candidates at UMB and UiS, institutions with high mobility, on average place more emphasis on "Institutional factors in Norway" than PhD candidates at the other four learning institutions. Among the two factors not included in the four main dimensions, "family/partner abroad" was the least important one, while "participation in courses not offered by the home institution" had a score similar to that of "research facilitated". In particular, candidates at UMB emphasize this as a motivation for going abroad.

Table 11: "What are the important factors for you when deciding whether to go abroad during your PhD studies?" 2010. Mean score on 1-6 scale (new variables based Q25)				
	"Personal development, language"	**"Career and network"**	**"Research facilitated"**	**"Institutional factors in Norway"**
Norwegian University of Life Sciences (UMB)	4.4	4.5	4.1	3.3
Norwegian University of Science and Technology (NTNU)	4.4	4.3	3.7	3.1
University of Bergen (UiB)	4.3	4.2	3.8	3.0
University of Oslo (UiO)	4.4	4.3	3.7	3.0
University of Stavanger (UiS)	4.4	4.3	3.3	3.6
NHH	4.5	4.4	3.5	3.3
Other tertiary learning institution	4.4	4.1	3.1	2.8
Total	4.4	4.3	3.7	3.1

The survey also asks those who have not gone abroad or lack specific plans to do so, about the deciding factors behind not going abroad. We can call these deciding factors in question 28 obstacles to PhD mobility. The mean scores on these obstacles by institution are shown in table 12 (see appendix).

However, to simplify the analysis of these results, we have created a set of index variables like we did on the deciding factors to go abroad, above. The categories "3. Insufficient foreign language skills" and "1. Family/children/partner at home" are kept as separate single-item variables, and two index variables are made: "Fear of little relevance/results" (categories 2, 8 and 9 in Q28) and "Lack of support and network" (categories 4-7 in Q28). In table 13, we see that family dependency at home seems to be a key obstacle to mobility, with an average score of 3.9. The average mean score for all candidates on the two index variables is around 3.0. Insufficient foreign language skills seems of little importance as an obstacle to mobility at the PhD level.

Table 13: "If you do not go abroad during your PhD studies, what are the deciding factors?" 2010. Mean score on 1-6 scale (new variables based Q28)				
	"Fear of little relevance/results"	**"Lack of support and network"**	**Family/children / partner at home**	**Insufficient foreign language skills**
Norwegian University of Life Sciences (UMB)	2.8	3.6	3.2	1.4
Norwegian University of Science and Technology (NTNU)	3.3	3.1	3.5	1.6
University of Bergen (UiB)	2.9	2.5	4.2	1.3
University of Oslo (UiO)	3.0	2.9	4.0	1.4
University of Stavanger (UiS)	3.0	2.8	4.3	1.5
NHH	2.6	2.8	4.1	1.5
Other tertiary learning institution	2.9	3.0	4.6	1.6
Total	3.0	2.9	3.9	1.5

There are some interesting variations between the learning institutions. "Fear of little relevance/results" seems to be considered as a more important obstacle by candidates at NTNU than at the other five institutions (remember that there are only a limited number of respondents from NHH, hence caution should be taken when interpreting the low mean score of 2.6 at NHH). "Lack of support and network" seems to be a more important obstacle at UMB (mean score of 3.6) compared with the other institutions, in particular compared with the mean score of 2.5 at UiB. How does this fit with what we have earlier said, that mobile candidates from UMB particularly emphasize institutional arrangements when asked why they decided to go abroad? This is not necessarily a contradiction. When we refer to institutional differences, the different patters do not necessarily apply to entire institutions. There may very well be considerable differences between sections or departments at a given institution regarding approach to mobility among PhD candidates.

Having family, children or a partner at home clearly constitutes the strongest barrier to mobility according to the candidates' response. However, we have earlier noted that there is not a major difference in the mobility rate between those with responsibility for children under the age of 18 and those candidates without dependent children. Looking more in detail into the issue, we find that responsibility for children might influence mobility differently, for example, for men and women.

Table 14: Mobility rate. By responsibility for children under the age of 18 and gender. 2010. Per cent		
	Per cent with stays abroad or specific plans to go abroad	
	No dependent children	**With dependent children**
1 Male (N:354)	52.1	52.0
2 Female (N=274)	51.4	41.9
Total	51.8	46.9

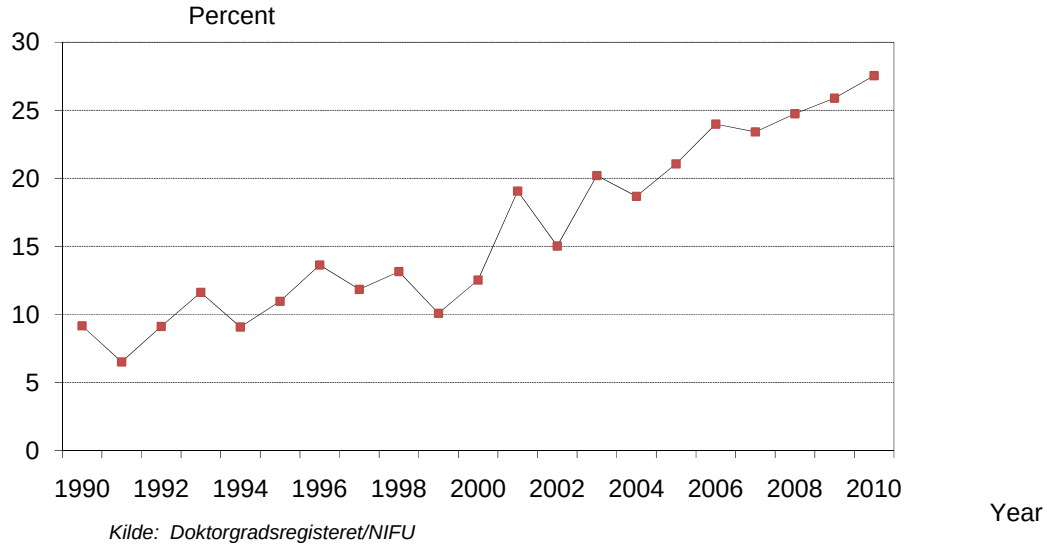
While there is no gender mobility gap among candidates without responsibility for dependent children, table 14 indicates a gap of 10 percentage points among male candidates with dependent children: Female candidates with responsibility for children are significantly less mobile than males with such child responsibility.

What we have found in this section is that a number of factors appear to influence PhD mobility. In particular, mobility differs between academic disciplines. In addition, mobility rates vary with various characteristics such as age, citizenship, responsibility for children and experiences of mobility in previous studies. However, even if we control for all the variables employed in our investigation, we still find that the institutional variable is important. Organizing PhD studies with a focus on possibilities for international mobility should be considered an important issue at the universities and university colleges. By promoting and facilitating international mobility, institutions, departments and faculties can strengthen the international participation and exposure of their PhD candidates.

5. Foreign citizens as PhD candidates at Norwegian HEIs

In a white paper from 2009, the Norwegian government presented different perspectives on the internationalisation of PhD education in Norway.[8] While outward mobility of PhD candidates in Norway is one important area, recruitment of talented candidates to Norway is another. During the last two decades, and in particular since 2000, the share of foreign candidates among PhD candidates at Norwegian HEIs has risen sharply. From only 9 per cent in 1990, to 13 per cent in 2000, the share of foreign citizens among completed PhD candidates reached 28 per cent in 2010.[9]

Fig. 16. PhD candidates 1990-2010. Share with foreign citizenship at point of completion.



Kilde: Doktorgradsregisteret/NIFU

The share of foreign citizens among PhD candidates is particularly high within technology, agricultural and fishery sciences, and mathematics and the natural sciences.

Table 15. PhD candidates 2010. Share of foreign citizens at the point of completion according to academic discipline. Per cent. Source: NIFU PhD statistics.	
HUMANITIES	15
SOCIAL SCIENCES	19
MATHEMATICS AND NATURAL SCIENCE	35
TECHNOLOGY	43
MEDICAL DISCIPLINES	24
AGRICULTURE AND FISHERY DISCIPLINES	39

[8] Report nr. 14 (2008-2009) to the Storting: 55-56.
[9] NIFU Doctoral Degree Register. www.nifu.no.

Table 16. PhD candidates 2010. Share of foreign citizens among completed PhD candidates at institutions. Per cent.	
University of Oslo	24
University of Bergen	32
Norwegian University of Science and Technology	26
University of Life Sciences	48
University of Tromsø	27
Universities of Agder and Stavanger combined	28

The statistics presented so far regarding the share of foreign citizens among PhD candidates at Norwegian HEIs is based on counting at the point of completion. Considering that the share of foreign citizens increased with almost 50 per cent from 2004 (19 per cent) to 2010 (28 per cent), and the fact that a PhD period lasts for several years, it seems reasonable to assume that the foreigner's share of the current PhD candidate population is even higher today.

While the share of foreign citizens in NIFU's statistics for 2010 is 28 per cent, the figure is 37 per cent among the respondents to our survey. As mentioned earlier, foreign nationals may be overrepresented among the NTNU respondents. If we exclude NTNU from the calculation, we find that 33 per cent of the candidates have foreign citizenship. The result clearly indicates that the share of foreign nationals is still growing, and that approximately one third of Norway's PhD candidates come from abroad.

Regarding the country of origin of the PhD candidates with foreign citizenship, there is a striking lack of correspondence with the destination countries for outward mobility. On the top five list among the countries of origin, only Germany is found in the top five of the destination countries for mobile candidates at Norwegian HEIs. Three of the top five countries sending PhD candidates to Norway (Iran, Ethiopia, and India) are not even among the 20 most important destinations for PhD candidates in Norway. It should be stressed that we have no information regarding short-term mobility to Norway among PhD candidates enrolled at foreign institutions. Nevertheless, the results from the survey clearly lead to the conclusion that Norwegian HEIs do not recruit their foreign PhD candidates in the countries or at the institutions that their established PhD candidates visit for cooperative or other research purposes. The Norwegian Quota Scheme has only a very limited influence.[10] If more than 3000 PhD candidates are foreign nationals, less than 10 per cent are supported by the Quota Scheme.

[10] The Quota Scheme supports full degree studies in Norway at the bachelor's, master's and PhD level and covers developing countries in the South, the Western Balkans, Eastern Europe and Central Asia.

Table 17. PhD candidates 2010. Foreign candidates according to country of citizenships. Share of all respondents in SIU's survey. Per cent. Estimate of total number of PhD candidates from country.

Citizenship	Percentage of respondents in SIU's survey	Estimate of total number of PhD candidates from country*
China	3.6	320
Germany	2.9	260
Iran	2.5	220
Ethiopia	2.0	180
India	1.7	150
Russian Federation	1.4	120
Sweden	1.3	115
France	1.0	90
Italy	1.0	90
Pakistan	0.9	80
Denmark	0.9	80
Indonesia	0.8	70
Poland	0.8	70
United States	0.8	70
Netherlands	0.7	60
Bangladesh	0.6	50
United Kingdom	0.6	50
Tanzania	0.5	45
Finland	0.5	45
Vietnam	0.5	45

* Based on the assumption that our respondents are representative for the PhD candidates as a group.

From discussions about mobility at the bachelor's and master's levels, we are well aware that foreign citizenship does not necessarily imply mobility for study purposes. At the beginning of 2011, approximately 7.5 per cent of Norway's population (0.37 mill.) were foreign citizens.[11] Consequently, many of the foreign citizens enrolled at HEIs in Norway came to Norway for other purposes than study. The results from the survey indicate, however, that approximately two thirds of PhD candidates with foreign citizenship came to Norway in connection with the PhD position.

[11] Statistics Norway. Foreign citizens. Number and as a percentage of population http://www.ssb.no/english/subjects/02/01/10/folkemengde_en/tab-2011-03-11-31-en.html

Table 18. In what connection did you come to Norway? N and per cent.		
	N	Per cent
I came to Norway in connection with the PhD position	598	67.3
I came to Norway to study at Bachelor/Master level	165	18.6
I came to Norway for other reasons than education	125	14.1

The last third are divided between candidates who came to study at the bachelor's or master's level and candidates who came to Norway for other purposes. The first group is slightly larger than the second.

So far we have discussed the share of foreign PhD candidates in Norway, their fields of study, institutional affiliation, country of origin as well as their recruitment to Norway. Concluding this section of mobility, we will develop a more detailed picture of the foreign candidates by looking at some of their central characteristics and comparing them with their Norwegian colleagues.

In the previous section, we considered citizenship as a factor for mobility rates, concluding that foreign citizens appear to be somewhat more mobile than Norwegian citizens.

Table 19. PhD candidates 2010. Characteristics of Norwegian citizens vs. candidates with other citizenship. Per cent.			
		Norw. citizens	**Other citizens**
Gender	Male	46	63
	Female	54	37
Age	≤ 30 years	38	54
	≥ 31 years	62	46
Children under 18	Yes	49	31
	No	50	79

Table 31 clearly shows that candidates with foreign citizenship as a group in several respects differ from the group of Norwegian candidates. The majority of the foreign candidates is male, they are considerably younger and they are much less likely to have the responsibility for children under 18 years of age. It is therefore hardly surprising that foreign PhD candidates on average are more mobile than Norwegian candidates. According to the analysis in the previous section, the mobility of foreign candidates is higher even if the differences in background factors are taken into account.

6. Conclusion

Throughout this report, we have attempted to answer the following main questions: What is the extent and character of international mobility among PhD candidates at Norwegian HEIs, and which are the most important factors behind the mobility patterns that we find?

Regarding the level of mobility, the basis for comparison is scarce and trends can hardly be identified. Nevertheless, looking at the Research Council's report from 2002 and NIFU's report from 2007, there could be some indication that mobility of more than one month's duration is declining. According to our results, approximately half of the PhD candidates have some kind of international mobility during their PhD period, including short-term events like conferences, seminars and workshops.

The survey unequivocally confirmed that the United States is the preferred destination for Norwegian PhD candidates. Mobility to this country is more than twice as high as the mobility to the second choice, the United Kingdom. For all academic disciplines, the USA is clearly the preferred destination.

Mobility rates vary with several factors. Particular differences are found when looking at mobility from the perspective of academic disciplines. Candidates within the humanities are most mobile – 71 per cent – while the lowest mobility rate is found in medical science with 26 per cent. In the social sciences, agricultural and fishery sciences, mobility is relatively high (approx. 55 per cent) and mathematics and the natural sciences represent the average with a little lower than 50 per cent. Technology is another relatively low mobility discipline with figures slightly below 40 per cent.

Considerable differences can be identified between institutions as well, and we have discussed what can be attributed to particularities at the institutions and what must be explained by looking at other factors. While mobility rates differ with factors such as gender, age, and responsibility for children, our logistic regression analysis of the different factors concludes that institutional affiliation remains important in the explanation of mobility patterns. Moreover, the conclusion is supported by the mobile candidates' response to questions about what made them go abroad. Respondents from institutions with the highest mobility rates, tend to emphasize institutional arrangements stronger than other respondents. On the background of the analysis itself, it is not possible to identify specific success factors for increased mobility. However, we believe that this focus on the significance of institutional arrangements and other factors influencing mobility rates will be helpful for institutions in developing further strategies for PhD education.

While the outward mobility of Norwegian candidates is one aspect of the internationalisation of the PhD education in Norway, recruitment of foreign citizens to Norway for PhD studies is another. During the last one and a half decades, the share of foreign nationals has risen sharply. According to statistics, 28 per cent of all PhD candidates who completed in 2010 were foreign citizens. Among our respondents, the share of foreign citizens is considerably higher (37 per cent), indicating that the growth is continuing. From a demographic point of view, the foreign citizens differ significantly from their Norwegian colleagues. They are younger, they have responsibility for children less often and there is a large male majority.

A final important conclusion from the survey is that PhD candidates who have been abroad for study purposes value the experience very positively. In particular, it seems that mobility experiences have positive effects on motivation for continued research work, and they contribute to the development of the identity of the aspiring researchers as confident and active members of an international research community.

APPENDIX 1: The logistic regression analysis

In table 15, we present the results from a binary logistic regression where our dependent variable is a dummy variable for mobility, coded 1 if the respondent has had a stay abroad in connection with their PhD studies, and 0 if the respondent has not had such a stay abroad. Our regression model includes independent variables for all the various characteristics (gender, age, etc.) discussed above and dummy variables for each of the learning institutions.

The regression coefficients from this kind of logit analysis can be difficult to interpret directly, apart from their sign (positive or negative effect on the dependent variable) and statistical significance. Hence, in the table below, we have opted for a more accessible way of presenting the results: Based on the regression coefficients, we have estimated the probability that a person has had a stay abroad, for a *reference individual* with the following characteristics:
Woman, less than 30 years old, candidate at UiO, no dependent children, field of study: Mathematics and natural sciences, foreign citizen and with no previous stays abroad.

We have then calculated similar probabilities for a set of "constructed individuals" who are identical to the reference individual with the exception of *one* characteristic (e.g. we change the gender to male instead of female, or the age to 31-35 years instead of less than 30 years). This gives us an idea of the difference in the probability of PhD mobility linked to that characteristic, i.e. its marginal effect on the probability.

Since the calculated probabilities are non-linear transformations of the estimated coefficients, the marginal effect on the probability of PhD mobility will to some extent depend on the probability of PhD mobility of the reference individual. The marginal effect will be stronger the closer the latter probability is to 50 per cent. Our reference individual has an estimated 41 per cent probability of PhD mobility.

The results in table 15 underpin much of what we have found in our previous cross-tabulations. Of particular importance to the focus of this chapter, we find that the institutional variable (represented by a set of institutional dummy variables) remains significant after we control for other characteristics. This indicates that the institutional differences in mobility rates should not merely be attributed to variations in the PhD candidate population across institutions. However, it is important to note that there are also likely to be other relevant characteristics of the PhD candidates (e.g. marks, income etc.) not included in our model due to lacking data. We also note that there is some change in the institutional pattern. When we control for gender, age, field of study, etc., the results indicate that NTNU has a mobility rate at about the same level as the University of Bergen, whereas NHH has a significantly lower mobility rate than the other large learning institutions.

When we control for the other variables in our regression model, age and child dependency do not have a statistically significant effect on mobility, unlike all the other variables. In line with the bivariate results, male candidates have a higher probability of having PhD stays abroad than female candidates, Norwegian citizens are somewhat less mobile than foreign citizens, previous studies abroad have a positive effect on mobility, and finally, candidates in "Technology" and the "Medical disciplines" are less mobile, and candidates in the "Humanities" are significantly more mobile than other candidates.

Table 15:Results from logit analysis of mobility rate. Estimated probabilities for "Constructed" individuals. 2010. Per cent	
Variable	**Estimated probability, has spent time abroad in connection with PhD**
Reference individual:	41
5 University of Oslo (UiO)	
Female	
25-30 years	
No dependent children under the age of 18	
Mathematics and natural sciences	
Not a Norwegian citizen	
No previous tertiary studies abroad	
Learning institution:	
Norwegian University of Life Sciences (UMB)	49
Norwegian University of Science and Technology (NTNU)	44
University of Bergen (UiB)	45
University of Stavanger (UiS)	64
NHH	26
Other tertiary learning institution	29
University of Oslo (UiO)	*Reference cat.*
Gender:	
Male	48
Female	*Reference cat.*
Age:	
31-35 years	42
36-40 years	45
41-50 years	45
over 50 years	38
Less than 30 years	*Reference cat.*
Dependent children:	
Dependent children under the age of 18	37
No dependent children under the age of 18	*Reference cat.*
Field of study:	
Humanities	68
Social sciences	54
Technology	27
Medical disciplines	25
Agriculture and fishery disciplines	41
Mathematics and natural sciences	*Reference cat.*
Citizenship:	
Norwegian citizen	34
Not a Norwegian citizen	*Reference cat.*
Previous tertiary studies abroad:	
Stays abroad: Bachelor	50
Stays abroad: Master	54
Stays abroad: Both levels	54
No previous tertiary studies abroad	*Reference cat.*

APPENDIX 2: Tables.

Table 2. Destination countries for PhD candidates. In per cent of all respondents and mobile respondents and estimated total number.
Selection: Candidates in the 3rd year or more with the given country as the only destination, main destination, or second most important destination. Per cent and estimate.

	Share of all respondents	Share of mobile respondents	Estimated total number of PhD candidates**
United States	14.3	32,9	1270
United Kingdom	6.6	15,3	590
Denmark	5.8	13,3	510
Sweden	4.4	10,3	400
Germany	4.3	9,9	380
France	3.5	8,1	310
Canada	2.0	4,7	180
Netherlands	2.0	4,5	170
Spain	1.9	4,3	170
China	1.7	4,0	150
Italy	1.7	4,0	150
Finland	1.6	3,8	150
Australia	1.2	2,9	110
Switzerland	1.2	2,9	110
Japan	1.1	2,5	100
Austria	0.9	2,2	80
Belgium	0.8	1,8	70
South Africa	0.8	1,8	70
Tanzania	0.8	1,8	70
Portugal	0.6	1,4	60
Uganda	0.6	1,4	60
Nepal	0.5	1,3	50
Greece	0.5	1,1	40
Malawi	0.5	1,1	40
Ethiopia	0.4	0,9	35
Russian Federation	0.4	0,9	35
Turkey	0.4	0,9	35
Czech Republic	0.3	0,7	*
Iceland	0.3	0,7	*
India	0.3	0,7	*
Ireland {Republic}	0.3	0,7	*
Brazil	0.2	0,5	*
Peru	0.2	0,5	*
Poland	0.2	0,5	*
Bangladesh	0.2	0,4	*
Chile	0.2	0,4	*
Ghana	0.2	0,4	*
Hungary	0.2	0,4	*
Israel	0.2	0,4	*
Malaysia	0.2	0,4	*

Romania	0.2	0,4	*
Sri Lanka	0.2	0,4	*
Thailand	0.2	0,4	*
Vietnam	0.2	0,4	*
Afghanistan	0.1	0,2	*
Argentina	0.1	0,2	*
Bolivia	0.1	0,2	*
Bosnia-Herzegovina	0.1	0,2	*
Croatia	0.1	0,2	*
Egypt	0.1	0,2	*
Estonia	0.1	0,2	*
Fiji	0.1	0,2	*
Guatemala	0.1	0,2	*
Iran	0.1	0,2	*
Jordan	0.1	0,2	*
Kenya	0.1	0,2	*
Korea South	0.1	0,2	*
Latvia	0.1	0,2	*
Luxembourg	0.1	0,2	*
Mali	0.1	0,2	*
Mozambique	0.1	0,2	*
New Zealand	0.1	0,2	*
Nicaragua	0.1	0,2	*
Pakistan	0.1	0,2	*
Qatar	0.1	0,2	*
Singapore	0.1	0,2	*
Syria	0.1	0,2	*
Taiwan	0.1	0,2	*
Ukraine	0.1	0,2	*
United Arab Emirates	0.1	0,2	*
Venezuela	0.1	0,2	*
Zambia	0.1	0,2	*
Zimbabwe	0.1	0,2	*

** Estimate of how many PhD candidates who visit the respective countries during their PhD period based on total number of registered PhD candidates in 2010 (8897).
* Figures too low to allow for estimate

Table 5: At which institution are you a PhD candidate?		
	Frequency	Per cent
Norwegian University of Life Sciences (UMB)	80	6.2
Norwegian University of Science and Technology (NTNU)	344	26.9
University of Agder (UiA)	2	.2
University of Bergen (UiB)	240	18.7
University of Oslo (UiO)	441	34.4
University of Stavanger (UiS)	56	4.4
University of Tromsø (UiT)	1	.1
BI - Norwegian School of Management	16	1.2
MF Norwegian School of Theology	6	.5
Molde University College, Specialized University in Logistics	5	.4
NHH	34	2.7
Norwegian School of Sport Sciences (NIH)	14	1.1
Oslo School of Architecture and Design (AHO)	11	.9
Akershus University College	2	.2
Bergen University College	4	.3
Bodø University College	11	.9
Gjøvik University College	1	.1
Oslo University College	4	.3
Saami University College	1	.1
Sogn og Fjordane University College	2	.2
Stord/Haugesund University College	1	.1
Vestfold University College	4	.3
Østfold University College	1	.1
Total	1281	100.0

Table 6: At which institution are you a PhD candidate?		
	Frequency	Per cent
Norwegian University of Life Sciences (UMB)	80	6.2
Norwegian University of Science and Technology (NTNU)	344	26.9
University of Bergen (UiB)	240	18.7
University of Oslo (UiO)	441	34.4
University of Stavanger (UiS)	56	4.4
NHH	34	2.7
Other tertiary learning institution	86	6.7
Total	1281	100.0

Table 10: Q25 "What are the important factors for you when deciding whether to go abroad during the PhD studies?" 2010. Mean score on 1-6 scale

	UMB	NTNU	UiB	UiO	UiS	NHH	Other tertiary learning institution	Total
1. Personal development	4.9	4.8	4.8	4.7	4.8	4.8	4.7	4.8
2. Intercultural skills and language skills	4.0	3.9	3.9	4.0	4.1	4.3	4.1	4.0
3. Opportunities of an international career	3.7	3.8	3.5	3.5	3.0	3.6	3.5	3.6
4. Family/partner abroad	1.7	2.1	1.7	2.0	1.6	2.8	1.9	1.9
5. International research theme	4.8	4.4	4.5	4.5	4.5	4.4	3.8	4.4
6. Data collection	3.7	3.3	3.5	3.5	2.3	3.4	2.6	3.3
7. Building network	4.9	4.6	4.6	4.6	4.9	4.8	4.6	4.6
8. Access to research infrastructure (libraries, laboratories, archives etc.)	3.6	3.3	3.4	3.2	2.9	2.6	2.8	3.2
9. Access to outstanding research groups/environment abroad	4.9	4.7	4.6	4.7	4.9	4.8	4.0	4.7
10. Participation in courses not offered by the home institution	4.7	3.2	3.9	3.6	3.7	3.6	3.8	3.6
11. Backing and expectations of supervisors/ research groups at home	3.6	3.4	3.4	3.4	3.2	3.8	3.3	3.4
12. Good assistance from home institutions in organizing the stay abroad	3.1	3.2	3.1	3.1	3.3	3.5	3.2	3.2
13. Exchange is integrated into the PhD programme	3.1	2.7	2.6	2.2	3.5	2.5	2.2	2.6
14. Good funding for going abroad	3.4	3.8	3.7	3.8	4.3	4.1	3.5	3.8

Table 12: Q28 "If you do not go abroad during your PhD studies, what are the deciding factors?" 2010. Mean score on 1-6 scale								
	UMB	**NTNU**	**UiB**	**UiO**	**UiS**	**NHH**	**Other tertiary learning institution**	**Total**
1. Family/children/partner at home	3.2	3.5	4.2	4.0	4.3	4.1	4.6	3.9
2. It is not necessary for my research	2.6	3.5	3.4	3.4	3.4	2.7	2.9	3.4
3. Insufficient foreign language skills	1.4	1.6	1.3	1.4	1.5	1.5	1.6	1.5
4. Lack of assistance/support from home institutions	3.3	2.8	2.3	2.7	2.5	2.6	3.0	2.7
5. Lack of backing and support from supervisors/research group at home	3.5	2.9	2.1	2.4	2.5	3.1	2.6	2.6
6. Lack of networks abroad	3.1	3.4	2.6	2.9	2.8	2.9	2.9	3.0
7. Lack of funding for going abroad	4.3	3.2	3.1	3.4	2.9	2.6	3.5	3.3
8. The best and most relevant research groups/environments in the fields are based in Norway	2.3	2.7	2.4	2.2	3.0	2.1	2.3	2.4
9. Lack of time/fear of delay in research and work progress	3.3	3.6	3.0	3.3	2.8	3.1	3.4	3.3

APPENDIX 3: The survey.

A national survey of international mobility at PhD level at Norwegian institutions.

1) At which institution are you a PhD candidate?
Select answer

2) What is your gender?
Male
Female

3) What is your age?
under 25
25-30
31-35
36-40
41-50
over 50

4) Do you have the responsibility for children under the age of 18?
Yes
No

5) * What is your field of study?
Please select relevant subcategory from the list

6) How long have you been a PhD candidate?
This is my 1st year
This is my 2nd year
This is my 3rd year
This is my 4th year
This is my 5th year or more

7) Are you a full-time PhD candidate?
Yes
No

8) Are you a part of a PhD Research school/Graduate school?
Yes
No

9) What is your main funding source?
The institution selected in question one
The Norwegian Research Council
Private enterprise/organisation
Public enterprise/organisation
National scholarships
International scholarship
Own funding

10) * Are you a Norwegian citizen?

Yes No

11) Please select the country of your citizenship
Select answer

12) Did you have any stays abroad in connection with previous studies?
Yes, at bachelor's/undergraduate level
Yes, at master's/graduate level
Yes, at both levels
No

13) In what connection did you come to Norway?
I came to Norway in connection with the PhD position
I came to Norway to study at bachelor's/master's level
I came to Norway for other reasons than education

14) * Have you spent time abroad in connection with your PhD studies?
Yes, I have had one or more stays abroad during my PhD period
No, but I have made plans involving a specific destination
No. I have not decided yet, but hope to find a good opportunity
No, it is unlikely that I will go abroad during my PhD period

15) * How many stays abroad have you had as a PhD candidate?
I have not been abroad yet, but will go abroad later in the PhD period
One stay
Two stays
Three stays
Four stays
Five stays
More than five stays

16) Type and duration of stays abroad
Less than 1 week
1-2 weeks
2-4 weeks
1-2 months
2-4 months
More than one semester
Conference, workshop, seminar
Data collection
Research visit at foreign institution
Other

17) * Have you visited more than one country?
Yes No

18) Which country have you visited?
Select answer

19) Please indicate your main country of destination
Select answer

20) Please indicate the second most important country of destination
Select answer

21) The decision to go abroad in connection with the PhD studies was largely a result of:
My own initiative
The initiative of my supervisor
Institutional arrangements

22) Who financed your stay(s) abroad? (Several answers possible)
The institution selected in question one
The Norwegian Research Council
Private enterprise/organisation
Public enterprise/organisation
National scholarships
International scholarship
Own funding
Other

23) Are you planning to travel abroad later in the PhD period?
Yes
No
Not decided

24) What kind of stay abroad have you planned?
Conference, workshop, seminar
Data collection
Research visit at foreign institution
Other

25) What are the important factors for you when deciding whether to go abroad during the PhD studies?
1. Personal development
2. Intercultural skills and language skills
3. Opportunities of an international career
4. Family/partner abroad
5. International research theme
6. Data collection
7. Building network
8. Access to research infrastructure (libraries, laboratories, archives etc.)
9. Access to outstanding research groups/environment abroad
10. Participation in courses not offered by the home institution
11. Backing and expectations of supervisors/research groups at home
12. Good assistance from home institutions in organizing the stay abroad
13. Exchange is integrated into the PhD programme
14. Good funding for going abroad

26) In what ways has your institution/supervisor/academic community contributed to your (plans for a) stay abroad?
Academic encouragement
General information

Practical advice and assistance
Financial advice and assistance
Building network relations

27) In what way have you benefited from your stay abroad?
It had significant impact on my research
I have developed networks of importance for future research
It increased my motivation for research work
It was a positive personal experience

28) If you do not go abroad during your PhD studies, what are the deciding factors?
1. Family/children/partner at home
2. It is not necessary for my research
3. Insufficient foreign language skills
4. Lack of assistance/support from home institutions
5. Lack of backing and support from supervisors/research group at home
6. Lack of networks abroad
7. Lack of funding for going abroad
8. The best and most relevant research groups/environments in the fields are based in Norway
9. Lack of time/fear of delay in research and work progress

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