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COVID-19 vaccination among immigrants from Europe and in their countries of birth

ORIGINAL ARTICLE

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BACKGROUND

Vaccination coverage for COVID-19 varies among immigrant groups in Norway and between different countries. Most likely, childhood/adolescence and consistent contact with the country of birth help form the attitudes to and the desire for vaccination. We therefore compared the vaccination rate among European-born immigrants in Norway and the vaccination coverage in their countries of birth.

MATERIAL AND METHOD

Vaccination coverage, the percentage of the adult population that had received at least one vaccination dose, for 22 European countries with universal access to vaccines by 31 August 2021 was retrieved from the European Centre for Disease Prevention and from the Norwegian emergency preparedness register for COVID-19 for the equivalent immigrant groups in Norway on 30 September 2021. Scatter plots with least-squares regression lines showed the association between the vaccination coverage in the country of birth and the rate in the equivalent immigration group in Norway, in total and by time of residence in Norway (< 6 years and ≥ 6 years).

RESULT

The model estimated an increase in the vaccination rate in immigrant groups in Norway of 0.64 percentage points for each percentage point increase in the vaccination coverage in their European countries of birth, and explained 63 % of the variation in the vaccination rate in the immigrant groups. There was no statistically significant difference in the co-variation with the country of birth when comparing immigrants with short versus long time of residence.

INTERPRETATION

There is a correlation between the vaccination rate for COVID-19 among European-born immigrants in Norway and the coverage in their countries of birth. Attitudes to and desire for vaccination varies between countries and can explain part of the observed differences between immigrant groups in Norway.

Main findings

In September 2021, vaccination coverage in European countries ranged between 24.3 % to 98.1 %, and from 44.0 % to 89.2 % among European-born immigrant groups in Norway.

There was a covariation between vaccination coverage among immigrant groups from Europe and the vaccination rate in their countries of birth.

Immigrants with a long period of residence in Norway had higher vaccination coverage than those with a short period of residence, but there was no significant difference in the covariation with the country of birth for people who have lived in Norway for a long or short period of residence.

Vaccination is critical to curb the COVID-19 pandemic and prevent hospital admissions and deaths. Norway secured access to vaccines through collaboration agreements with the EU and the EEA, and began vaccinating the population in late 2020/early 2021. Initial access to vaccines was limited, and priority was given to the elderly, clinically vulnerable groups and healthcare personnel, followed by municipalities and local districts with a persistently high infection rate. In July and August 2021, the vaccines were recommended for and offered to everyone over the age of 18, including pregnant women. In Norway, participation in the COVID-19 vaccination programme is free and voluntary (1). The local authorities (municipalities) are responsible for vaccination.

Early in the pandemic, the attitude towards COVID-19 vaccines was found to differ among immigrants from different countries, and people born in Eastern Europe, Africa and Western Asia showed greater reluctance to get vaccinated or greater doubts than people born in Norway (2). Reluctance to get vaccinated declined in all immigrant groups after the COVID-19 vaccines became available (2), but updated figures from the Norwegian Institute of Public Health show that there are differences in the vaccination coverage in the population by country of birth, age, sex, and municipality of residence (3). A Norwegian, non-peer-reviewed study found a variation in vaccination coverage by country of birth among healthcare personnel as well (4). We recently examined vaccination coverage among immigrants in Norway, and found that it was particularly low among immigrants from Eastern Europe (5). We also found that income and education provide little explanation of the variation in vaccination coverage between different immigrant groups (5). In this article, we seek to investigate whether differences in vaccination coverage between immigrant groups are related to vaccination coverage in their countries of birth.

Thirty countries participate in the vaccination cooperation in the EU and EEA, and the target was a 70 % vaccination rate in the adult populations of the member countries by the summer of 2021 (6). The different countries offered the same vaccines (Comirnaty, Spikevax, Vaxzevria and COVID-19 Vaccine Janssen) but at somewhat different times, and two countries included Sputnik V in their vaccination programmes (7, Table 18, p. 24). Each country had its own vaccination strategy, which was adapted to access to vaccines, information about their efficacy and risks associated with the different vaccines, changes in the infection rate and new virus variants (1, p. 8). They all prioritised the elderly, clinically vulnerable groups and healthcare personnel (7). Access to vaccines has been good since June 2021 (7, p. 5), and most European countries have offered vaccines to all inhabitants over the age of 12 since September (7, p. 12) and have recommended vaccinating pregnant women (7, p. 12). In September 2021, 8 out of 26 reporting countries had introduced or considered mandatory vaccination of personnel in the health, care and social welfare sectors (7, p. 17), and COVID-19 certificates were used in every country for access to medical treatment and for travel between most countries (7, p. 18). The requirement to produce a COVID-19 certificate for access to places like restaurants and museums and events like concerts has varied, and was mandatory in 16 European countries in August 2021 (8).

Despite equal access to vaccines, vaccination coverage has varied throughout Europe. In July 2021, 15 out of 22 countries reported difficulty increasing vaccination uptake among the population (7, p. 18). Surveys conducted in 2020, before vaccination had begun, showed that the proportion of people who intended to get vaccinated declined over time in several countries (9). A stated intention to refuse vaccination was more prevalent among young people, women, ethnic minority groups, and people in lower socio-economic groups (9). The rate of acceptance of the COVID-19 vaccines by inhabitants of European countries like Italy, Poland and France, was among the lowest in the world in December 2020 (10).

Considering the good availability of vaccines, attitudes towards these are formed by education, health literacy and past experiences with vaccines, and they can be influenced by family, colleagues, the media and general trust in society, and the health services (11). Vaccine concerns vary in each country and in relation to the different vaccines (2). It is likely that attitudes to COVID-19 vaccination among immigrant groups in Norway are shaped by their childhoods in their countries of birth and/or their continued contact with other people born in the same country or who still live in these countries. We therefore examined whether there was a correlation between vaccination coverage in different European countries and people who belong to the associated immigrant groups in Norway. We also looked at whether the correlation differed for immigrants who had lived in Norway for a long or short period of time, as a simple measurement of possible increased influence from Norwegian society and decreased influence from the country of birth.

Material and method

Data sources and variables

Our definition of 'vaccinated person' is someone who has received at least one vaccine dose, and 'vaccination coverage' is the cumulative proportion of vaccinated people as at 30 September 2021, where the numerator is the number of first vaccine doses administered to people aged 18 and over and the denominator is the population in this age group.

The Norwegian data is from the emergency preparedness register for COVID-19 (Beredt C19) (12), which contains individual, non-identifiable data from several sources. We used data from the Norwegian Immunisation Registry SYSVAK (vaccination status), the Norwegian Population Register (sex, age, population, and period of residence) and Statistics Norway (country of birth and income).

We dichotomised period of residence as short (< 6 years) or long (≥ 6 years). We have not identified a standard definition for short and long period of residence. We used 'period of residence' in our study as a simple measurement of integration. We set a limit of six years, based on the expectation that a training programme would be completed by then and other education or work would have begun. There is no information about the period of residence for

about 4 100 out of 276 506 people (1.5 %). These people, who are elderly, were excluded from the analyses in relation to period of residence, likely as a result of inadequate registration at the time of migration.

We defined 'immigrants' as people who were born abroad, and the country in which the mother lived when she gave birth was registered as the country of birth.

The vaccination coverage in other countries is taken from the European Centre for Disease Prevention and Control (ECDC) COVID-19 Vaccine Tracker (13).

Information about access to vaccines is from the Oxford COVID-19 Government Response Tracker (14), retrieved from Our World in Data (15, 16). Access to vaccines is categorised as 1) no access, 2) access for one out of three prioritised groups: key personnel, people who are clinically vulnerable and the elderly, 3) access for two out of three prioritised groups, 4) access for all prioritised groups, 5) group 4 plus other broad (age) groups, and 6) universal access. Table 1 shows the month in which different countries began offering vaccines to the entire adult population in 2021. The age composition for European countries comes from the UN (17).

Table 1

Timeline for universal access to vaccines in the European countries included and Norway in 2021 (16).

February–April	May	June	July	August
Bulgaria	Latvia	Germany	Lithuania	Norway
Romania	Poland	Belgium	The Netherlands	Turkey
Hungary	Iceland	Italy	Denmark	Portugal
Slovakia	France	Finland	Austria	Croatia
	Estonia	Czech Republic	Sweden	
			Spain	

Study population

Our starting point was all immigrant groups with over 1 000 permanent residents aged 18 and over in Norway with a European country of birth (35 countries), including countries with universal access to vaccines by the end of August 2021 (27 countries), where the European Centre for Disease Prevention and Control had up-to-date data on vaccination coverage for the population aged 18 or older (22 countries) (Figure 1).

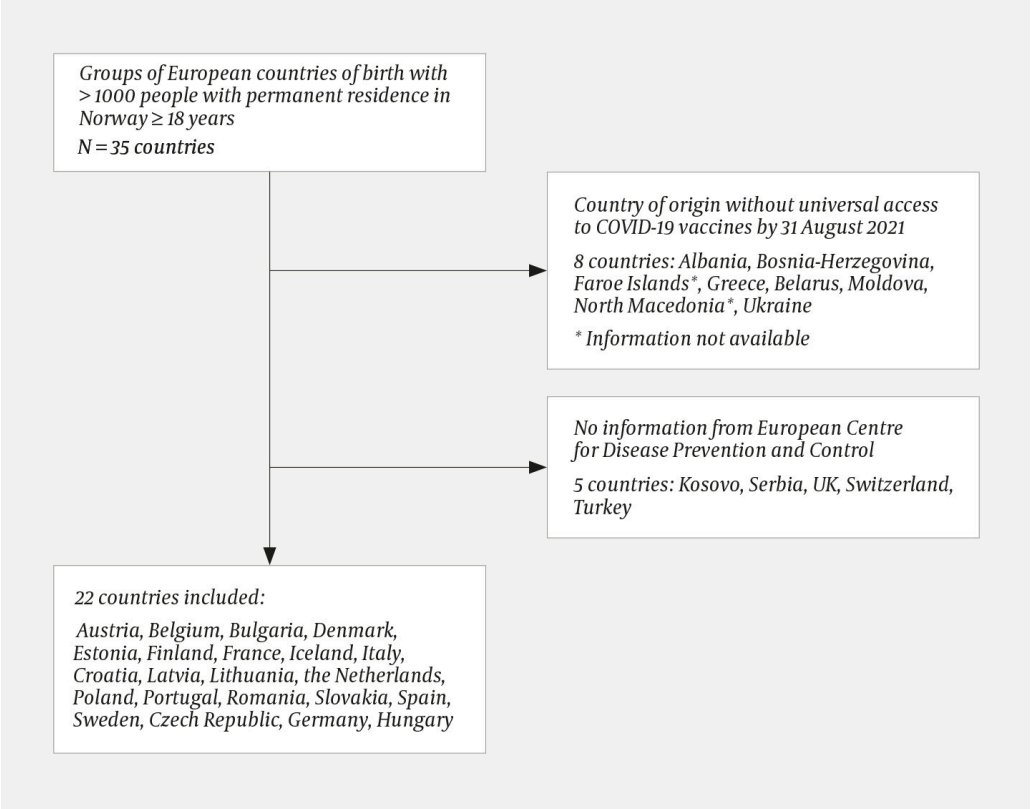

Figure 1 Flow chart for inclusion of immigrant groups and country of birth

Analysis

We present the 22 immigrant groups, indicating the population, sex distribution, average age with standard deviation, period of residence in Norway and median income, compared with the population born in Norway, and the proportions of the population aged 65 or older in the immigrant groups and in the countries of birth.

We have calculated the vaccination coverage among immigrants in Norway by country of birth and period of residence in Norway. We have obtained the vaccination coverage for their countries of birth, and have calculated the difference between this and the coverage in the immigrant groups.

The correlation between vaccination coverage in the country of birth and immigrant group has been examined for the entire immigrant group and by period of residence in Norway. A graphical presentation of this is given in scatter plots with least squares regression lines. Here the vaccination coverage in the country of birth is the explanatory variable (x) for the outcome (y), vaccination coverage in immigrant groups. The slope corresponds to the increase in vaccination coverage in immigrant groups in Norway in percentage points, by percentage point increase in vaccination coverage in the country of birth. A slope that is close to 0 indicates little to no correlation, while a slope that is close to 1 indicates a strong correlation between vaccination coverage in the country of birth and immigrant groups. The slope is presented with a 95 % confidence interval (CI).

Ethical and privacy considerations

The Beredt C19 register was established under section 2 - 4 of the Emergency Preparedness Measures for Health Act, and the Norwegian Institute of Public Health has assessed the impact of the register on privacy.

This study is part of the project 'Social inequality, migration and COVID-19', which has been approved by the Regional Committees for Medical and Health Research Ethics (9 March 2021, no. 198964).

Results

A total of 276 506 people in Norway were born in the 22 countries included (Table 2). Seven immigrant groups had virtually identical sex distributions (49–51 % proportion of women). Men were in the majority in the remaining countries, except for Finland. The average age of the immigrants was 43 years, and ranged from 39 (Lithuania) to 56 (Denmark) years. The proportion of people aged 65 and older was lower than for countries of birth of all immigrant groups, except for people born in Austria and Denmark (Figure 2).

Table 2

Socioeconomic and demographic characteristics of people in the population born in Norway and immigrants born in 22 different European countries as at 11 November 2021. SD = standard deviation, N/A = not applicable.

Country of birth	Number aged > 18	Proportion of women, %	Proportion with period of residence < 6 years, %	Average age, years (SD)	Median income, NOK
Norway	3 575 107	50	N/A	50 (19)	401 387
Total born abroad	276 506	46	17	43 (14)	344 282
Austria	1 181	49	16	51 (19)	397 015
Belgium	1 110	47	22	46 (16)	372 544
Bulgaria	6 153	45	19	42 (12)	264 725
Denmark	16 807	47	9	56 (18)	399 165
Estonia	3 778	49	12	41 (11)	308 206
Finland	5 869	63	12	53 (16)	383 889
France	4 919	44	29	42 (15)	389 357
Iceland	5 753	49	7	46 (15)	374 510
Italy	3 847	36	29	43 (15)	336 058
Croatia	4 617	45	24	45 (14)	328 541
Latvia	9 139	43	18	40 (11)	288 064

Country of birth	Number aged > 18	Proportion of women, %	Proportion with period of residence < 6 years, %	Average age, years (SD)	Median income, NOK
Lithuania	34 447	42	16	39 (10)	298 172
The Netherlands	6 984	44	11	49 (17)	376 922
Poland	88 040	36	13	42 (11)	301 084
Portugal	2 942	40	23	42 (12)	337 323
Romania	13 015	45	20	40 (10)	302 621
Slovakia	3 155	41	15	41 (11)	329 915
Spain	5 084	45	31	41 (14)	328 373
Sweden	32 278	49	8	47 (15)	406 026
Czech Republic	1 863	51	17	46 (16)	343 067
Germany	22 175	49	11	48 (16)	377 190
Hungary	3 350	50	18	47 (17)	331 435

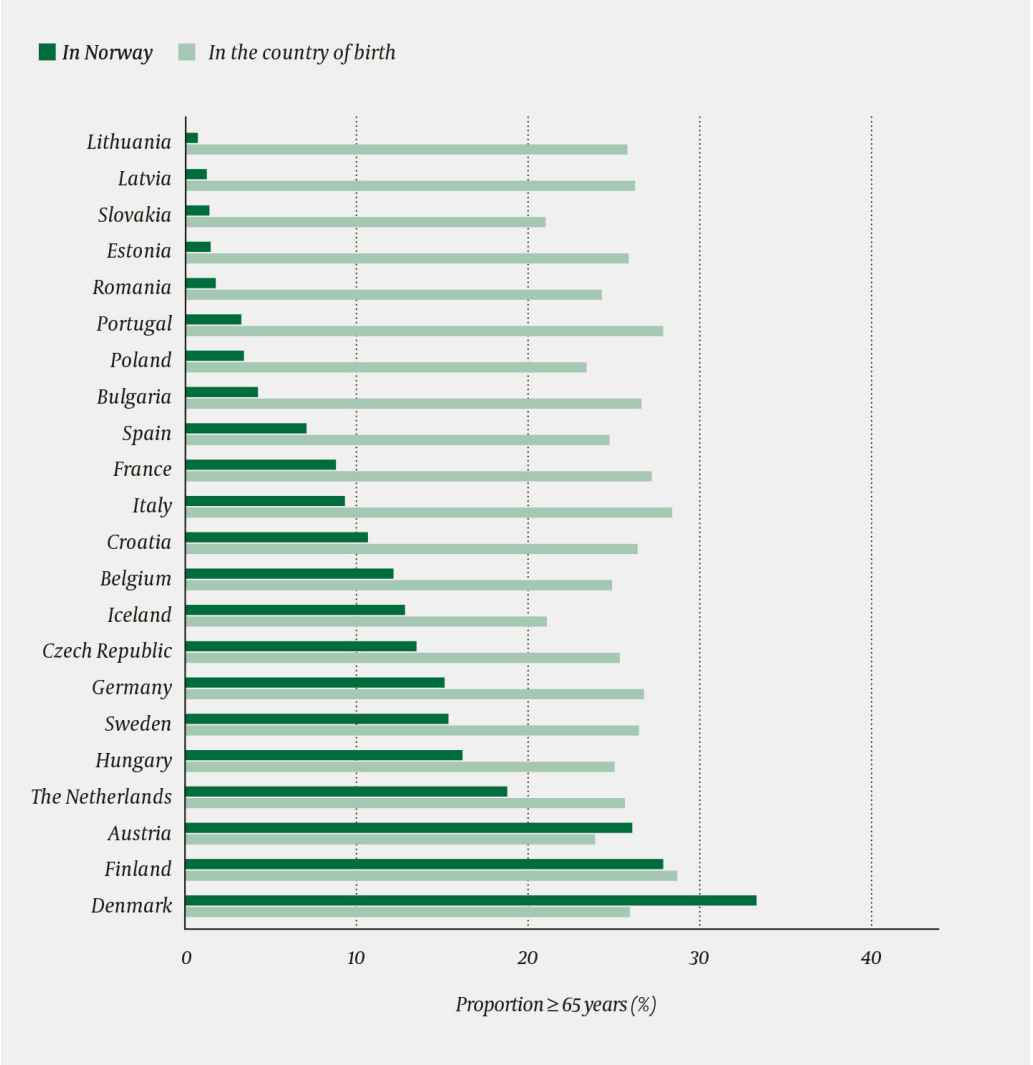

Figure 2 Proportion of people aged 65 or older in the immigrant groups and countries of birth as at 2020.

In Norway, vaccination coverage among immigrant groups ranged from 44.0 % (Latvia) to 89.2 % (Denmark) (Table 3). Similarly, vaccination coverage in their countries of birth ranged from 24.3 % (Bulgaria) to 98.1 % (Portugal). There was great variation in the differences between vaccination coverage in the countries of birth and Norway, from over 20 percentage points more vaccinated people in Lithuania, France and Portugal to 20 percentage points fewer vaccinated people in Bulgaria than among immigrants from these countries of birth in Norway. For 15 of the 22 countries included, vaccination coverage was higher in the country of birth than in the respective immigrant groups in Norway. The vaccination coverage was higher for immigrants with a long period of residence in Norway than for those with a short period of residence.

Table 3

COVID-19 vaccination coverage (%) among immigrants in Norway born in 22 European countries and their respective countries of birth as at 30 September 2021.

	In Norway			In the country of birth	Difference country of birth – Norway (total)
Country	Short period of residence (< 6 years)	Long period of residence (≥ 6 years)	Total	Total	(percentage points)
Lithuania	38.0	49.2	47.4	73.4	26.0
France	44.7	81.1	70.8	95.5	24.7
Portugal	69.2	79.7	77.3	98.1	20.8
Spain	56.9	80.1	73.0	90.5	17.5
Poland	35.6	47.2	45.8	61.8	16.1
Estonia	38.3	53.1	51.4	67.0	15.6
Italy	57.9	78.5	72.7	85.6	12.9
Latvia	30.9	46.9	44.0	55.7	11.7
Belgium	58.6	84.7	79.4	86.8	7.4
Iceland	76.3	86.4	85.8	92.0	6.2
Denmark	79.0	89.7	89.2	95.3	6.1
Czech Republic	49.2	67.2	65.0	67.2	2.3
Germany	60.7	81.5	79.6	81.6	2.0
Finland	66.1	87.6	85.0	86.5	1.5
The Netherlands	71.4	87.0	85.5	86.7	1.3
Hungary	58.1	70.5	69.7	68.8	-0.9
Slovakia	49.1	55.2	54.4	53.4	-1.0
Sweden	80.9	88.8	88.4	84.7	-3.6
Austria	62.8	86.7	83.2	75.2	-8.0
Romania	32.2	48.4	45.2	35.3	-9.9
Croatia	51.3	69.8	65.5	54.3	-11.2
Bulgaria	31.3	47.9	44.8	24.3	-20.5

The covariation for vaccination coverage in the European countries of birth and associated immigrant groups is shown in Figure 3 for the entire immigrant group, while Figure 4 shows the covariation for vaccination coverage between countries of birth and immigrant groups, by short and long period of residence.

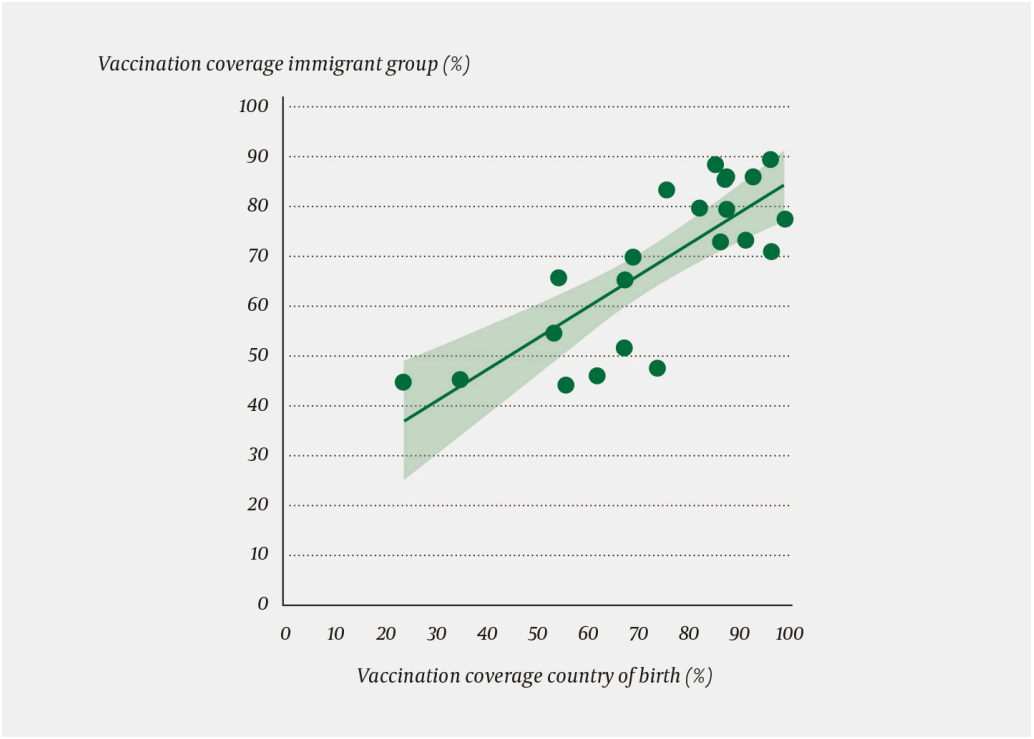

Figure 3 Scatter plot with regression line (95 % CI shaded) for COVID-19 vaccination coverage in the country of birth and associated immigrant group as at 30 September 2021.

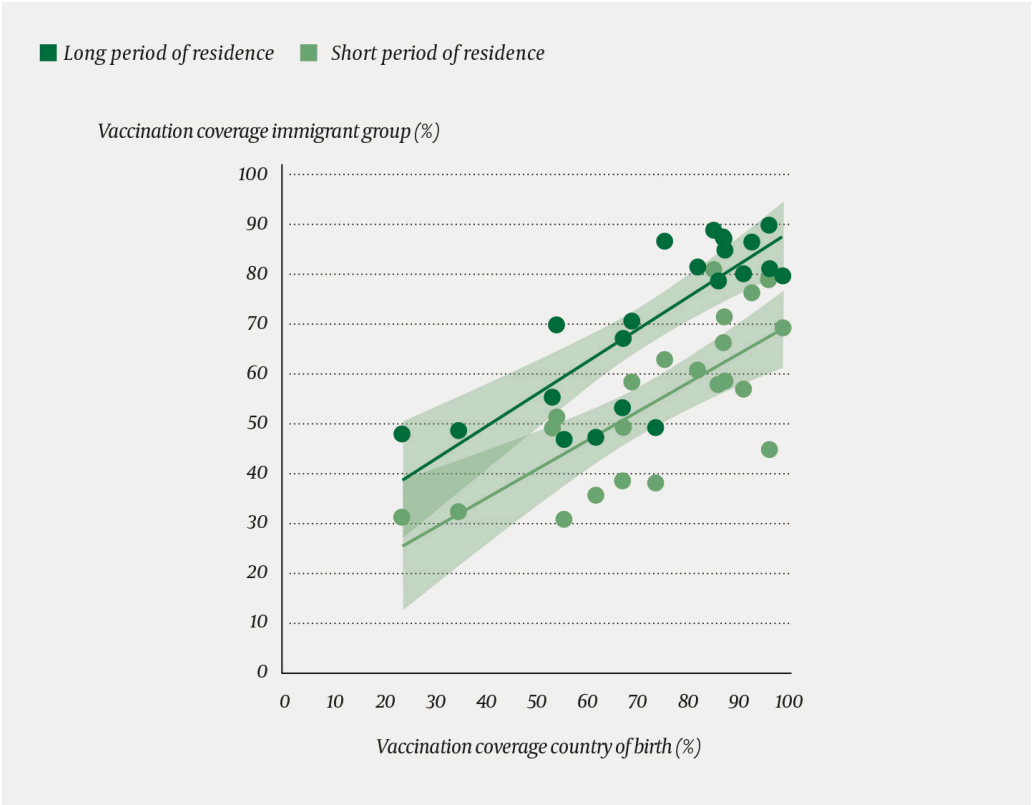

Figure 4 Scatter plot with regression lines (95 % CI shaded) for COVID-19 vaccination coverage in the country of birth and associated immigrant group with short (< 6 years) and long (≥ 6 years) period of residence in Norway as at 30 September 2021

Figure 4 Scatter plot with regression lines (95 % CI shaded) for COVID-19 vaccination coverage in the country of birth and associated immigrant group with short (< 6 years) and long (≥ 6 years) period of residence in Norway as at 30 September 2021

The covariation between vaccination coverage in the country of birth and immigrant groups in Norway can be described as a 0.64 (95 % CI 0.41 to 0.87) percentage point increase in coverage in immigrant groups for each percentage point increase in the country of birth. The model explained 63 % of the variation in vaccination coverage in the immigrant groups. Correspondingly, the slope for people with a short period of residence was 0.59 (95 % CI 0.34–0.84) with a 55 % explained variance and 0.66 (95 % CI 0.44–0.89) with a 66 % explained variance for people with a long period of residence.

Discussion

Vaccination coverage varied between immigrant groups in Norway, between European countries and between immigrant groups and countries of birth. Immigrants with a long period of residence in Norway had a higher vaccination coverage than those with a short period of residence. There was a clear covariation between vaccination coverage in immigrant groups in Norway and the associated European countries of birth.

Considering the perceived good access to vaccines, attitudes to vaccination and the desire for vaccination are shaped by individual competence and experience, family and the local community, as well as trust in information, the health service and society (11). Attitudes can vary in different countries and in relation to vaccines (18). Vaccine uptake has been reported as being unsatisfactory among young people, ethnic minorities and other socioeconomically vulnerable groups in several European countries (7, p. 18–19). These groups in Norway were uncertain or reluctant to get vaccinated against COVID-19 before vaccination began in this country (2), as well as globally (9, 10, 19). Vaccination coverage also increases among immigrant groups in Norway by age and income, while it has been shown that most of the differences in COVID-19 vaccination coverage between different immigrant groups and people born in Norway cannot be explained by socioeconomic and demographic composition (5). The clear correlation between COVID-19 vaccination coverage in European countries and associated immigrant groups indicates systematic differences in attitudes to vaccination and the desire for vaccination among immigrant groups. This can explain some of the disparity in vaccination coverage among immigrants and people born in Norway beyond that which can be explained by socioeconomic and demographic factors.

The composition of the immigrant groups is younger than in the country of birth, and lower vaccination coverage among immigrants than in the country of birth therefore may be expected, as shown for 15 out of 22 immigrant groups in this study. Immigrants with a long period of residence have a higher vaccination coverage than those with a short period of residence, and there is again reason to assume that age composition plays a part. The covariation with the country of birth was not significantly dissimilar according to the period of residence, which may indicate that systematic differences in attitudes to vaccination and the desire for vaccination influenced by childhood or continued contact with the country of birth endure for some time in immigrant groups.

The COVID-19 vaccination coverage achieved in different countries is influenced by different strategies for vaccination, incentives and restrictions. There has been fairly extensive use of COVID passports (COVID-19 certificates) in Austria (7, p. 18, Belgium (7, p.) 18, Estonia (7, p. 18), France (20), Italy (7, p. 18), Lithuania (7, p. 18), Portugal (21) and Romania (7, p. 18). With the exception of Austria and Romania, the vaccination coverage in these countries in September was higher than in associated immigrant groups in Norway. For example, vaccination coverage among people in Norway who were born in France is closer to the estimate for those who expressed the intent to get vaccinated in France before vaccination began (9) than vaccination coverage in France in September. This may indicate that active use of COVID-19 certificates trumps an initial national tendency to accept COVID-19 vaccines, and may explain some of the differences between immigrant groups and countries of birth. The lower vaccination coverage in immigrant groups than in their countries of birth may also be due to a failure to register vaccines administered in the home country. This can be particularly relevant to the nine countries of birth which had universal access to vaccines before June. Finally, general barriers may explain part of the lower vaccination coverage among immigrants, such as a lack of adapted and simple information about vaccines and lack of knowledge of services, and difficulty getting to the vaccination site (22, 23).

Targeted measures to increase COVID-19 vaccination coverage in different groups require an understanding of specific barriers (22), but there is little knowledge about the reasons for low coverage among countries of birth in Norway (2) and different countries in Europe (7, p. 19). Some factors can be highlighted in accordance with known sources of influence (11, 18), such as certain countries having had historically low trust in the safety and efficacy of vaccines (24) and long-term distrust of national institutions (25). New experiences which can impact on willingness to get a COVID-19 vaccine are variation in vaccine recommendations from country to country, for example for pregnant women (7, p. 12) and in relation to combining different vaccines (7, p. 16). The type of vaccine offered is important (18), and several countries have reported greater scepticism towards certain COVID-19 vaccines (7, p. 19, 26). Misinformation about vaccines (7, p. 19, 21) and negative attitudes among healthcare personnel have been a challenge in some countries (24).

The strength of this study is that there was good access to vaccines in all of the countries included by August 2021 (Table 1), and we can therefore assume that attitudes and willingness provide a better explanation for differences in vaccination coverage than access to vaccines. The study was limited to the correlation between vaccination coverage in the country of birth and immigrant groups from 22 European countries, as access to vaccines, data reporting and vaccination programmes in other countries were considered to be inadequate or too dissimilar to be comparable. It is a strength that the information about vaccination coverage comes from reputable registers. Vaccination coverage figures in the different age groups were available, but were considered to be beyond the scope of this study. Such data may provide more detailed information about covariation, which would be relevant in a follow-up study. The European Centre for Disease Prevention and Control does not have data on vaccination coverage by sex and socioeconomic metrics, which is why it is not

possible to explore covariation taking these variables into account. There is a limitation in Norwegian vaccination data in that vaccines administered abroad must be entered individually into the Norwegian Immunisation Registry SYSVAK, with a fee to be paid. We therefore assumed that there was some underreporting of vaccines administered abroad, resulting in somewhat conservative estimates of vaccination coverage in the immigrant groups. County health surveys of different immigrant groups indicate a low level of non-registration of vaccination (unpublished data at present). If people have visited their country of birth and recovered from COVID-19 there, they may consider that to be sufficient immunity, without this being registered in Norwegian data.

We do not consider the limitations in the study to be extensive, and stand by the finding of high covariation between vaccination coverage in the country of birth and immigrant groups. To further explore whether attitudes to vaccines are shaped by their childhoods and contact with their country of birth, thereby influencing vaccination coverage in an immigrant group, it would be interesting to examine whether the differences in immigrant groups in Norway from countries of birth with strong incentives to vaccinate the population may be found in other countries with similar incentives to those in Norway. It would also be interesting to investigate how the level of integration, beyond period of residence, impacts on immigrants' attitudes to vaccination over time.

Conclusion

The covariation between vaccination coverage among European immigrants in Norway and the coverage in the country of birth means it is reasonable to assume that attitudes to vaccines are partly shaped by one's childhood and lasting contact with the country of birth. Local authorities should therefore be alert to vaccination coverage in the countries of birth when assessing vaccination coverage in different immigrant groups. Barriers to vaccination are also specific to the country, group or vaccine, meaning that qualitative mapping of this and collaboration with the different immigrant groups appear to be necessary to find good, targeted measures and to achieve good vaccination coverage in the different groups. Consideration should be given to implementing measures to ensure that vaccines administered abroad are registered in Norway.

This article has been peer reviewed.

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