Progress Toward Hepatitis B Control — World Health Organization European Region, 2016–2019

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In 2019, an estimated 14 million persons in the World Health Organization (WHO) European Region* (EUR) were chronically infected with hepatitis B virus (HBV), and approximately 43,000 of these persons died from complications of chronic HBV infection (1). In 2016, the WHO Regional Office for Europe set hepatitis B control program targets for 2020, including 1) ≥90% coverage with 3 doses of hepatitis B vaccine (HepB3), 2) ≥90% coverage with interventions to prevent mother-to-child transmission (MTCT) of HBV,[†] and 3) ≤0.5% prevalence of HBV surface antigen (HBsAg)[§] in age groups eligible for vaccination with hepatitis B vaccine (HepB) (2–4). This report describes the progress made toward hepatitis B control in EUR during 2016–2019. By December 2019, 50 (94%) of 53 countries in EUR provided routine vaccination with HepB to all infants or children aged 1–12 years (universal HepB), including 23 (43%) countries that offered hepatitis B birth dose (HepB-BD) to all

newborns. In addition, 35 (73%) of the 48 countries with universal infant HepB vaccination reached ≥90% HepB3 coverage annually during 2017–2019, and 19 (83%) of the 23 countries with universal birth dose administration achieved ≥90% timely HepB-BD coverage[¶] annually during that period. Antenatal hepatitis B screening coverage was ≥90% in 17 (57%) of 30 countries that selectively provided HepB-BD to infants born to mothers with positive HBsAg test results. In January 2020, Italy and the Netherlands became the first counties in EUR to be validated to have achieved the regional hepatitis B control targets. Countries can accelerate progress toward hepatitis B control by improving coverage with HepB and interventions to

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[¶] A timely HepB birth dose is defined as a dose administered within 24 hours of birth.

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* EUR is one of six WHO regions and consists of the following 53 member states (total population, approximately 932 million): Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malta, Moldova, Monaco, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Russia, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, United Kingdom, and Uzbekistan.

† In EUR, interventions to prevent MTCT of HBV include either 1) administering a timely birth dose of HepB vaccine to all newborns (universal birth dose policy) or 2) conducting routine antenatal screening of pregnant women for hepatitis B and vaccinating infants born to HBV-infected mothers with HepB birth dose within 24 hours of birth (selective birth dose policy), either of which is followed by ≥2 additional vaccine doses according to the national immunization schedule. In addition, some countries provide antiviral treatment to pregnant women with positive HBsAg test results and administer hepatitis B immune globulin at birth to infants of infected mothers.

§ Before introduction of vaccination, the HBV endemicity in EUR, defined by HBsAg antigen seroprevalence, ranged widely from low (<2.0%) in 25 countries, to intermediate (2.0%–7.9%) in 25 countries, to high (≥8.0%) in three countries.

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prevent MTCT and documenting achievement of the HBsAg seroprevalence target through representative serosurveys or, in low-endemicity countries, antenatal screening.

Immunization Activities

As a major intervention to prevent perinatal and childhood hepatitis B infections, WHO recommends that all infants receive ≥3 doses of HepB, including a timely birth dose (5). Most countries in EUR introduced HepB vaccination >15 years ago (Table 1). Countries report information on immunization schedules and coverage annually to WHO and UNICEF using the WHO/UNICEF Joint Reporting Form. WHO and UNICEF review administrative coverage data and surveys to generate country-specific coverage estimates.**

In 2019, 48 (91%) of the 53 countries in EUR provided universal routine infant HepB vaccination, two[††] (4%) (Hungary and Slovenia) provided universal routine HepB vaccination to children aged 5–12 years, and three countries (6%) (Denmark, Finland, and Iceland) implemented selective HepB vaccination, only immunizing those born to mothers with positive HBsAg test results.[§§] Twenty-three (43%) countries provided HepB-BD to all newborns, and 30 (57%) provided HepB-BD selectively to children born to mothers

with positive HBsAg test results. During 2016–2019, regional HepB3 coverage increased from 82% to 92%, partly because three more countries (Norway, Switzerland, and the United Kingdom)[¶¶] introduced universal infant HepB vaccination during 2017–2018. Among the countries that provided universal infant HepB vaccination, those that reported ≥90% HepB3 coverage among infants increased from 37 (82%) of 45 countries during 2016–2017 to 41 (85%) of 48 countries in 2019. However, HepB3 coverage was <90% for ≥3 years during 2016–2019 in six countries.[***] Of the 21 countries with universal HepB-BD that reported birth dose coverage to WHO,[†††] coverage with timely HepB-BD during 2016–2019 was ≥90% in 2019–2020 (90%–95%).

Antenatal Screening and Postexposure Prophylaxis

The 30 countries that implement a selective HepB-BD policy aim to prevent MTCT of HBV infection through antenatal HBV screening combined with postexposure prophylaxis of infants born to mothers with positive HBsAg test results. Information on implementation of these interventions is not routinely reported to WHO. Based on the responses to a survey conducted by the WHO Regional Office for Europe in

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** https://immunizationdata.who.int/listing.html?topic = coverage&location = eur

†† In Hungary, HepB is given at age 12 years, and in Slovenia, it is given at age 5–6 years.

§§ All countries are in northern Europe and have historically had very low HBV endemicity.

¶¶ Norway and the United Kingdom in 2017, and Switzerland in 2018.

*** Austria, Bosnia and Herzegovina, Germany, Montenegro, San Marino, and Ukraine.

††† Bosnia and Herzegovina and Russia do not report HepB-BD coverage.

TABLE 1. Year of introduction of hepatitis B vaccine, hepatitis B vaccine routine vaccination and birth dose policies, vaccination schedule, coverage with a third dose of hepatitis B vaccine and a timely hepatitis B birth dose, and antenatal screening for hepatitis B virus infection — World Health Organization European Region, 2016–2019

Country (year of HepB introduction*,†)	HepB vaccination policy*,§			HepB3 coverage,* %					Timely HepB-BD coverage,* %					Antenatal screening	
	Infant/ Childhood	At birth	2019 HepB schedule*	Year				≥90% each year, 2017–2019¶	Year				≥90% each year, 2017–2019¶	In place**	Coverage, %††
				2016	2017	2018	2019		2016	2017	2018	2019			
Albania (1994)	Universal	Universal	B, 2, 4, 6 mos	98	99	99	99	Yes	99	99	99	99	Yes	—	—
Andorra (1997)	Universal	Selective	2, 4, 12 mos	94	98	98	98	Yes	NA	NA	NA	NA	NA	Yes	NR
Armenia (2000)	Universal	Universal	B, 6, 12, 18 wks, 18 mos	94	94	92	92	Yes	98	97	97	96	Yes	—	—
Austria (1997)	Universal	Selective	2, 4, 10 mos	87	90	85	85	No	NA	NA	NA	NA	NA	Yes	NR
Azerbaijan (2001)	Universal	Universal	B, 2, 3, 4 mos	97	95	95	94	Yes	99	99	99	98	Yes	—	—
Belarus (1996)	Universal	Universal	B, 2, 3, 4 mos	96	98	98	97	Yes	98	98	98	98	Yes	—	—
Belgium (1996)	Universal	Selective	8, 12, 16 wks, 15 mos	97	97	97	97	Yes	NA	NA	NA	NA	NA	Yes	80–85
Bosnia and Herzegovina (2001)	Universal	Universal	B, 1, 6 mos	78	77	80	80	No	NR	NR	NR	NR	NR	—	—
Bulgaria (1991)	Universal	Universal	B, 1, 6 mos; B, 2, 3, 4 mos	91	92	85	85	No	96	97	96	96	Yes	—	—
Croatia (1999)	Universal	Selective	2, 4, 6, 18 mos	92	92	93	93	Yes	NA	NA	NA	NA	NA	Yes	>90
Cyprus (1989)	Universal	Selective	2, 4, 8–12 mos	97	97	97	94	Yes	NA	NA	NA	NA	NA	Yes	NR
Czechia (2001)	Universal	Selective	3, 5, 11 mos	96	94	96	97	Yes	NA	NA	NA	NA	NA	Yes	100
Denmark (2009)§§	Selective	Selective	—	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Yes	99.9
Estonia (2003)	Universal	Selective	3, 4.5, 6 mos, 2 yrs	93	92	93	91	Yes	NA	NA	NA	NA	NA	Yes	>90
Finland (1993)§§	Selective	Selective	—	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Yes	97.8
France (1994)	Universal	Selective	2, 4, 11 mos	90	90	91	91	Yes	NA	NA	NA	NA	NA	Yes	92.4
Georgia (2001)	Universal	Universal	B, 2, 3, 4 mos	92	91	93	94	Yes	94	94	97	94	Yes	—	—
Germany (1995)	Universal	Selective	2, 3, 4, 11–14 mos	87	87	87	87	No	NA	NA	NA	NA	NA	Yes	>90
Greece (2000)	Universal	Selective	2, 4, 6–18 mos	96	96	96	96	Yes	NA	NA	NA	NA	NA	Yes	91.3
Hungary (1999)¶¶	Universal	Selective	12 yrs	NR	NR	NR	NR	NR	NA	NA	NA	NA	NA	Yes	90
Iceland (2011)§§	Selective	Selective	—	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Yes	50
Ireland (2008)	Universal	Selective	2, 4, 6 mos	95	95	94	93	Yes	NA	NA	NA	NA	NA	Yes	>95
Israel (1998)	Universal	Universal	B, 1, 6 mos	95	97	96	96	Yes	95	95	95	95	Yes	—	—
Italy (1982)	Universal	Selective	2, 4, 11 mos	93	94	95	95	Yes	NA	NA	NA	NA	NA	Yes	97.7
Kazakhstan (1998)	Universal	Universal	B, 2, 4 mos	82	99	98	97	Yes	95	90	95	93	Yes	—	—
Kyrgyzstan (2001)	Universal	Universal	B, 2, 3.5, 5 mos	96	92	94	95	Yes	96	97	97	96	Yes	—	—
Latvia (1997)	Universal	Selective	2, 4, 6, 12–15 mos	98	98	96	99	Yes	NA	NA	NA	NA	NA	Yes	88
Lithuania (1998)	Universal	Universal	B, 1, 6 mos	95	94	93	92	Yes	97	97	97	97	Yes	—	—
Luxembourg (2003)	Universal	Selective	2, 3, 13 mos	94	94	96	96	Yes	NA	NA	NA	NA	NA	Yes	95
Malta (2005)	Universal	Selective	12, 13, 18 mos	97	88	98	98	No	NA	NA	NA	NA	NA	Yes	100
Moldova (1995)	Universal	Universal	B, 2, 4, 6 mos	90	89	94	94	No	99	96	96	93	Yes	—	—
Monaco (1994)	Universal	Selective	2, 4, 11 mos	99	99	99	99	Yes	NA	NA	NA	NA	NA	Yes	NR
Montenegro (2006)	Universal	Selective	9, 13 wks, 9 mos	75	73	72	72	No	NA	NA	NA	NA	NA	No	—
Netherlands (2011)***	Universal	Selective	2, 3, 4–11 mos	93	92	92	92	Yes	NA	NA	NA	NA	NA	Yes	99
North Macedonia (2004)	Universal	Universal	B, 2, 6 mos	94	91	92	92	Yes	98	98	98	98	Yes	—	—
Norway (2017)***	Universal	Selective	3, 5, 12 mos	NA	NA	NR	96	ID	NA	NA	NA	NA	NA	Yes	NR
Poland (1997)	Universal	Universal	B, 7–8 wks, 7 mos	95	93	91	91	Yes	93	93	93	93	Yes	—	—
Portugal (1994)	Universal	Universal	B, 2, 6 mos	98	98	98	98	Yes	97	97	97	97	Yes	—	—
Romania (1995)	Universal	Universal	B, 2, 4, 11 mos	90	92	93	90	Yes	93	36	68	99	No	—	—
Russia (2000)	Universal	Universal	B, 1, 6 mos	97	97	97	97	Yes	NR	NR	NR	NR	NR	—	—
San Marino (1995)	Universal	Selective	3, 5, 11 mos	86	82	78	87	No	NA	NA	NA	NA	NA	Yes	100
Serbia (2006)	Universal	Universal	B, 4 wks, 10 mos	91	93	91	94	Yes	99	99	99	99	Yes	—	—
Slovakia (1997)	Universal	Selective	2, 4, 10 mos	96	96	96	97	Yes	NA	NA	NA	NA	NA	Yes	NR
Slovenia (1998)¶¶,†††	Universal	Selective	5 yrs (2 doses), 6 yrs	88	89	87	88	No	NA	NA	NA	NA	NA	Yes	NR
Spain (1996)	Universal	Selective	2, 4, 11 mos	97	95	96	96	Yes	NA	NA	NA	NA	NA	Yes	NR
Sweden (2016)	Universal	Selective	3, 5, 12 mos	67	76	92	97	No	NA	NA	NA	NA	NA	Yes	NR
Switzerland (2018)¶¶,§§§	Universal	Selective	2, 4, 12 mos; 11–15 yrs, +6 mos	69	69	96	96	ID	NA	NA	NA	NA	NA	Yes	97

See table footnotes on the next page.

TABLE 1. (*Continued*) Year of introduction of hepatitis B vaccine, hepatitis B vaccine routine vaccination and birth dose policies, vaccination schedule, coverage with a third dose of hepatitis B vaccine and a timely hepatitis B birth dose, and antenatal screening for hepatitis B virus infection — World Health Organization European Region, 2016–2019

Country (year of HepB introduction[*],[†])	HepB vaccination policy[*],[§]			HepB3 coverage,[*] %					Timely HepB-BD coverage,[*] %					Antenatal screening	
	Infant/ Childhood	At birth	2019 HepB schedule[*]	Year				≥90% each year, 2017–2019[¶]	Year				≥90% each year, 2017–2019[¶]	In place[**]	Coverage, %[††]
				2016	2017	2018	2019		2016	2017	2018	2019			
Tajikistan (2002)	Universal	Universal	B, 2, 3, 4 mos	97	96	96	97	Yes	92	99	99	99	Yes	—	—
Turkey (1998)	Universal	Universal	B, 1, 6 mos	98	96	98	99	Yes	99	99	99	99	Yes	—	—
Turkmenistan (2002)	Universal	Universal	B, 2, 3, 4 mos	98	99	99	99	Yes	99	99	99	99	Yes	—	—
Ukraine (2003)	Universal	Universal	8, 12, 16 wks	26	52	67	76	No	37	49	60	60	No	—	—
UK (2017)[***]	Universal	Selective	B, 2, 6 mos	NA	NA	NR	93	ID	NA	NA	NA	NA	NA	Yes	>95
Uzbekistan (2001)	Universal	Universal	B, 2, 3, 4 mos	99	99	98	96	Yes	99	99	95	99	Yes	—	—
European Region[¶¶¶]	—	—	—	82	84	84	92	—	66	65	67	68	—	—	—

Abbreviations: B = birth; DTaP-Hib-HepB-IPV = hexavalent vaccine containing diphtheria and tetanus toxoids, acellular pertussis, *Haemophilus influenzae* type b, hepatitis B, and inactivated poliovirus components; HBsAg = hepatitis B virus surface antigen; HepB = hepatitis B vaccine; HepB3 = third dose of HepB; HepB-BD = birth dose of HepB; ID = insufficient data to determine (no reports for 1 or 2 years); NA = not applicable; NR = not reported; UK = United Kingdom; +6 mos = 6 months after the previous dose.

[*] https://immunizationdata.who.int

[†] Introduction of universal infant HepB vaccination into national immunization schedules. Exceptions: HepB was introduced regionally or subnationally before nationwide introduction in the following countries: Bosnia and Herzegovina (1999), Estonia (1999), Georgia (2000), Kyrgyzstan (1999), Poland (1995), Serbia (2002), Spain (1991), Sweden (2014), Ukraine (2001), and Uzbekistan (1997).

[§] HepB vaccination policy: universal = all persons in the applicable age group (i.e., all infants, children aged 1–12 years, or adolescents aged 13–15 years for routine HepB vaccination, and all newborns for HepB-BD) receive HepB; selective = only infants born to mothers with positive HBsAg test results receive HepB vaccination, starting with HepB-BD.

[¶] Two of the criteria for validation of hepatitis B control are 1) to achieve HepB3 coverage ≥90% for the 3 preceding years, applicable only to countries with universal infant HepB vaccination policy and 2) to achieve timely HepB-BD coverage ≥90% for the 3 preceding years, applicable only to countries with universal HepB-BD policy.

[**] A criterion for validation of hepatitis B control, applicable only to countries with selective HepB-BD policy; data for other countries not included. Sources: WHO 2018 Regional Office for Europe survey (Andorra, Austria, Belgium, Czechia, Estonia, France, Germany, Hungary, Ireland, Italy, Latvia, Malta, Monaco, Montenegro, the Netherlands, Norway, San Marino, Slovakia, Spain, and Switzerland); https://apps.who.int/iris/bitstream/handle/10665/85397/9789241564632_eng.pdf?sequence=1 (Cyprus, Denmark, Finland, Iceland, Luxembourg, Slovenia, and Sweden); reports submitted to the Regional Hepatitis B Working Group (Croatia and UK); https://europepmc.org/article/PMC/1475591 (Greece).

[††] A criterion for validation applicable only to countries with selective HepB-BD policy. Sources: 2018 WHO Regional Office for Europe survey (Czechia, Germany, Italy, Latvia, San Marino, and Switzerland); https://www.ecdc.europa.eu/sites/default/files/media/en/publications/Publications/antenatal-screening-HIV-hepatitis-B-syphilis-rubella-EU.pdf (Belgium, Estonia, Hungary, Iceland, Ireland, Luxembourg, and Malta); reports submitted to the Regional Hepatitis B Working Group (Croatia, the Netherlands, and UK); https://en.ssi.dk/surveillance-and-preparedness/surveillance-in-denmark/annual-reports-on-disease-incidence/pregnancy-screening-2019 (Denmark); https://www.julkari.fi/bitstream/handle/10024/114883/URN_ISBN_978-952-302-057-3.pdf?sequence = 1&isAllowed = y (Finland); http://beh.santepubliquefrance.fr/beh/2015/15-16/pdf/2015_15-16_4.pdf (France); https://europepmc.org/article/PMC/1475591 (Greece).

[§§] Denmark, Finland, and Iceland do not have universal HepB in their routine childhood immunization schedules but selectively vaccinate only infants born to mothers with positive HBsAg test results.

[¶¶] Vaccination of older children or adolescents (Hungary, 12 years; Slovenia, 5–6 years; Switzerland, 11–15 years during 1997–2018, before switching to universal infant HepB immunization).

[***] HepB was given only to infants of mothers with positive HBsAg test results before transition to universal infant vaccination in the Netherlands (2002–2010), Norway (2002–2016), and UK (2001– mid-2017).

[†††] Slovenia does not vaccinate infants against HepB; therefore, WHO/UNICEF estimates are not generated. Instead, country-reported official HepB3 coverage among children aged 6 years is included.

[§§§] In Switzerland, reported coverage with HepB for adolescents until 2018. Since 2018, WHO/UNICEF estimates of coverage with the third dose of hepatitis B-containing hexavalent vaccine (DTaP-Hib-HepB-IPV) among infants (reported as DTP3).

[¶¶¶] A weighted sum of WHO/UNICEF estimates of national coverage by target population from the United Nations Population Division's World Population Prospects for all 53 countries of the region. HepB3 coverage includes all 53 countries in EUR. HepB-BD coverage includes 23 countries that implement universal birth dose policy. Two countries, Bosnia and Herzegovina and Russia, do not report HepB-BD coverage, but their population is included in the denominator, resulting in lower coverage in this group than in most individual countries with reported coverage data.

2018[§§§] and published reports, 29 (97%) of those 30 countries[¶¶¶] conducted nationwide antenatal screening for HBsAg (Table 1). Antenatal screening coverage data were available for 20 (69%) of these countries, and 17 (85%) reported ≥90% coverage.[****] Among infants born to HBV-infected mothers in these countries,

immunization coverage data were available for HepB-BD in nine (31%) countries[††††] and for HepB3 in five (17%)[§§§§] countries. HepB-BD coverage exceeded 90% in all nine countries, and HepB3 coverage exceeded 90% in four of five countries.

[§§§] The survey was sent to the 50 member states of EUR that implement universal HepB vaccination and included questions on HepB vaccination policy, practices, and measures to prevent perinatal transmission of HBV. Survey questions were designed to account for differences in HepB-BD policy between the member states (universal versus selective). Forty-three (86%) countries, including 22 of 23 countries with universal HepB-BD policy and 21 of 30 countries with selective HepB-BD policy, responded to the survey.

[¶¶¶] Montenegro reported not having nationwide antenatal screening in place.

[****] Six countries (Czechia, Estonia, France, Greece, Ireland, and Luxembourg) also had ≥90% coverage with routine HepB3 among infants each year during 2017–2019 (i.e., met the validation criteria for immunization).

[††††] Croatia, Czechia, Denmark, Italy, Malta, the Netherlands, Slovakia, Switzerland, and the United Kingdom. Sources: the 2018 WHO Regional Office for Europe survey (Croatia, Czechia, Malta, Slovakia, and Switzerland); reports submitted to the WHO European Regional Hepatitis B Working Group (the Netherlands and the United Kingdom), https://www.sciencedirect.com/science/article/pii/S0264410X11016355?via%3Dihub (Denmark); https://www.sciencedirect.com/science/article/pii/S0163445310003518?via%3Dihub (Italy).

[§§§§] Czechia, the Netherlands, Slovakia, Switzerland, and the United Kingdom; coverage was <90% only for Switzerland. Sources: the 2018 WHO Regional Office for Europe survey; reports submitted to the WHO European Regional Hepatitis B Working Group (the Netherlands and the United Kingdom).

HBsAg Seroprevalence

Because most chronic HBV infections are asymptomatic, particularly among young children, the impact of hepatitis B vaccination is assessed based on the HBsAg seroprevalence among children (6). However, in EUR, because of early regional introduction of HepB, the age group for serosurveys for validation purposes is defined as cohorts eligible for HepB vaccination. For EUR countries with low endemicity before vaccine introduction (prevaccine), where conducting large-scale hepatitis B serosurveys might not be justified, HBsAg seroprevalence of ≤0.5% among pregnant women is considered acceptable evidence that the seroprevalence target was achieved.

By December 2019, representative nationwide or regional serosurveys have demonstrated ≤0.5% HBsAg seroprevalence in at least one vaccinated or partially vaccinated age group in five countries and in a prevaccine cohort in one country (the Netherlands) (Table 2). Serosurveys initiated recently for validation purposes in several countries, in some cases with support from WHO and other international partners, have been put on hold because of the COVID-19 pandemic. HBsAg seroprevalence of ≤0.5% among pregnant women has been reported from nine (36%) of 25 countries with low endemicity, sometimes with higher prevalence among foreign-born women than among women who were not foreign-born (e.g., Denmark, Italy, and the Netherlands) (Table 2).

Validation

The Hepatitis B Regional Working Group of the European Technical Advisory Group of Experts was established in 2017 and developed the framework and criteria for validation of achievement of the regional hepatitis B control targets for countries in EUR (Table 3). The validation process was initiated in 2019. In 2019, the regional validation criteria for immunization coverage were met for HepB3 by 35 (73%) of 48 countries providing universal infant HepB vaccination and for timely HepB-BD by 19 (83%) of 23 countries implementing universal newborn vaccination, including 17 (32%) countries that met both criteria (Table 1). In January 2020, Italy and the Netherlands were validated to have achieved the regional hepatitis B control targets. The United Kingdom received conditional validation based on fully meeting the MTCT prevention and seroprevalence criteria (in antenatal screening), and by partially meeting immunization coverage criteria pending availability of 3 full years of data.¶¶¶¶ Croatia received conditional validation pending clarification of methods for assessing coverage with MTCT prevention interventions.

¶¶¶¶ At the time of review of the validation documents by the WHO European Regional Hepatitis B Working Group, 3 years had not yet passed since introduction of universal HepB vaccination in the United Kingdom in mid-2017.

Discussion

During 2016–2019, EUR made substantial progress toward achieving hepatitis B control, resulting in validation of the first two countries (Italy and the Netherlands) and conditional validation of two other countries (Croatia and the United Kingdom). This progress is supported by a recent modeling study, which demonstrated 0.1% HBsAg seroprevalence among children aged 5 years in EUR (3). Among the 49 countries that have not yet initiated the validation process, 17 (74%) of 23 with a universal HepB-BD policy have met the HepB3 coverage and HepB-BD coverage criteria, and six (23%) of 26 countries with a selective birth dose policy met HepB3 coverage and antenatal screening coverage targets. Eight (16%) of these 49 countries met the ≤0.5% HBsAg seroprevalence target.

To accelerate validating achievement of the regional hepatitis B control target in EUR, some countries could consider submitting available documentation for validation, whereas others still need to generate the evidence required for validation. Although conducting nationally representative hepatitis B serosurveys might be challenging, and because the COVID-19 pandemic has further challenged their implementation, hepatitis B testing can be incorporated into other nationally representative serosurveys, including COVID-19 serosurveys, where feasible.

The historic differences in HBsAg prevalence and the diversity of HepB immunization strategies across EUR necessitated a differential approach to validation of hepatitis B control depending on national prevaccine endemicity and HepB vaccination policies. Although HepB3 immunization coverage is high in most countries, it remains consistently <90% in six countries, reflecting challenges in their immunization services. Countries can address these challenges by 1) providing sufficient support to national immunization programs to strengthen immunization systems, 2) monitoring public perception toward vaccinations and developing tailored strategies to create demand for vaccination among all population groups, and 3) strengthening immunization information systems to improve quality and availability of coverage data (6–8). The two countries in EUR with universal birth dose policy that currently do not report HepB-BD coverage (Bosnia and Herzegovina and Russia) will need to establish systems for monitoring and reporting birth dose coverage.

In countries that provide selective HepB-BD vaccination, establishing systems for continual monitoring of coverage with antenatal screening and HBsAg-positivity among pregnant women and of coverage with HepB-BD and HepB3 among exposed infants is needed to provide reliable data on seroprevalence and interventions to prevent MTCT of HBV for validation purposes. Available seroprevalence data showed a much higher prevalence of hepatitis B among foreign-born

TABLE 2. Hepatitis B virus surface antigen seroprevalence based on representative population-based serosurveys or among pregnant women during antenatal screening in selected countries — World Health Organization European Region, 2003–2019

Country	Year	Geographic area	Age group, yrs (sample size)	Vaccination status*	HBsAg prevalence, % (95% CI)[†]
Population-based representative serosurveys					
Germany[§]	2008–2011	Nationwide	≥18 (7,047)	Prevaccine and partially vaccinated	0.3 (0.2–0.6)
Netherlands[¶]	2007	Nationwide	0–79 (6,246)	Prevaccine	Overall, 0.2 (0.1–0.4)
					Dutch, 0.1 (0.0–0.4)
					Foreign-born, 1.1 (0.4–2.7)
Portugal**	2012–2014	Nationwide	≥18 (1,685)	Pre- and postvaccine	Post-vaccine (18–34 yrs), 0.1 (NR)
Spain[††]	2017–2018	Nationwide	2–80 (6,056)	Pre- and postvaccine	Post-vaccine (2–19 yrs), 0 (NR)
					Combined pre-and postvaccine (20–80 yrs), 0.22 (0.10–0.35)
Tajikistan[§§]	2010	Nationwide	1–24 (2,188)	Pre- and postvaccine	Postvaccine (1–6 yrs), 0.4 (0.1–1.3)
Among pregnant women (in countries with selective hepatitis B birth dose vaccination policy)					
Croatia[¶¶]	2016–2018	Nationwide	NA	NA	<0.2
Denmark***	2019	Nationwide	NA	NA	Overall, 0.25
					Danish-born, <0.01
					Foreign-born, 0.25
Finland[†††]	2005–2009	Nationwide	NA	NA	0.13
Ireland[§§§]	2004–2009	Western Ireland	NA	NA	0.21
Italy[¶¶¶]	2008–2009	Twelve regions	NA	NA	Overall, 0.86
					Italian-born, 0.4
					Foreign-born, 2.5
Netherlands****	2012–2016	Nationwide	NA	NA	0.3
Norway[††††]	2003–2004	Northern Norway	NA	NA	0.1
Spain[§§§§]	2015	Nationwide	NA	NA	0.42
UK[¶¶¶¶]	2015	England	NA	NA	0.4

Abbreviations: CI = confidence interval; HBsAg = hepatitis B virus surface antigen; HepB = hepatitis B vaccine; NA = not applicable; NR = not reported; UK = United Kingdom.
* Postvaccine = age groups eligible for vaccination with HepB; prevaccine = age groups not eligible for HepB vaccination; partially vaccinated = age groups in which some people were vaccinated before nationwide introduction of routine childhood HepB vaccination; combined pre- and postvaccine = age group for which estimates are provided include both pre- and postvaccine cohorts.
[†] Applicable to population-based serosurveys only.
[§] https://edoc.rki.de/bitstream/handle/176904/1530/221UAZ0QXaYVg.pdf?sequence=1&isAllowed = y
[¶] https://www.cambridge.org/core/services/aop-cambridge-core/content/view/0A7381A4CB391EE13C5028444DCEDA91/S095026881100224Xa.pdf/prevalence_of_hepatitis_b_virus_infection_in_the_netherlands_in_1996_and_2007.pdf
** https://journals.lww.com/eurojgh/Fulltext/2016/06000/Hepatitis_B_and_C_prevalence_in_Portugal_.5.aspx
[††] https://www.mscbs.gob.es/profesionales/saludPublica/prevPromocion/vacunaciones/comoTrabajamos/docs/EstudioSeroprevalencia_EnfermedadesInmunoprevenibles.pdf
[§§] https://www.sciencedirect.com/science/article/pii/S0264410X15007665
[¶¶] The report submitted to the WHO European Regional Hepatitis B Working Group.
*** https://en.ssi.dk/surveillance-and-preparedness/surveillance-in-denmark/annual-reports-on-disease-incidence/pregnancy-screening-2019
[†††] https://www.julkari.fi/bitstream/handle/10024/114883/URN_ISBN_978-952-302-057-3.pdf?sequence = 1&isAllowed = y
[§§§] http://archive.imj.ie/ViewArticleDetails.aspx?ContentID = 3961
[¶¶¶] https://doi.org/10.1016/j.jinf.2010.11.014
**** The report submitted to the WHO European Regional Hepatitis B Working Group.
[††††] Kristiansen MG, Eriksen BO, Maltau JM, et al. Prevalences of viremic hepatitis C and viremic hepatitis B in pregnant women in Northern Norwa. Hepato-Gastroenterology 2009;56:1141–5.
[§§§§] https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0233528
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populations in several countries in EUR. Ensuring access to MTCT prevention measures for underserved populations, including immigrants, ethnic minorities, and other vulnerable groups, can help mitigate the impact of increased migration from high- and intermediate-endemicity areas on HBsAg prevalence in low-endemicity countries (*9*).

The findings in this report are subject to at least three limitations. First, missing HepB-BD coverage data for Bosnia and Herzegovina and Russia prevent determining whether these countries have met the HepB-BD coverage target. Second, timely HepB-BD coverage estimates might not be accurate for countries that do not monitor timeliness of HepB-BD

administration. Finally, some HBsAg seroprevalence estimates were obtained >15 years ago and might not reflect the current prevalence in cohorts eligible for vaccination.

Despite progress made during 2016–2019, achieving the 2020 hepatitis B control goal in EUR will require programmatic improvements in underperforming countries. To accelerate the validation process, most countries will need to generate additional evidence of having achieved the regional targets. Some low- and middle-income countries will require continued external support to conduct serosurveys. Further, the COVID-19 pandemic has caused disruptions in immunization services and led to delays in implementation of serosurveys.

TABLE 3. Criteria for country validation of the achievement of the regional hepatitis B control targets, according to the Hepatitis B Regional Working Group, European Technical Advisory Group of Experts — World Health Organization European Region

Area of assessment*	Criteria	Comment
Routine hepatitis B immunization coverage	≥90% coverage for infants with ≥3 doses of hepatitis B vaccine (according to national immunization schedule)	For countries that implement universal hepatitis B vaccination; in each of the last 3 years
Prevention of mother-to-child transmission of hepatitis B virus	≥90% coverage with timely hepatitis B birth dose vaccination	For countries that implement universal newborn vaccination; in each of the last 3 years
	≥90% coverage with hepatitis B screening in pregnant women and ≥90% coverage with postexposure prophylaxis in infants born to infected mothers[†]	For countries that implement selective hepatitis B birth dose policy; in each of the last 3 years, if the data are routinely collected; one time, if based on a special assessment
HBsAg seroprevalence	≤0.5% HBsAg prevalence in cohorts eligible for vaccination	Required for countries with high and intermediate pre-vaccine endemicity of hepatitis B[§]
	≤0.5% HBsAg prevalence among pregnant women	Alternative criterion acceptable only for countries with historically low endemicity of hepatitis B

Abbreviation: HBsAg = Hepatitis B surface antigen.
* For a country to receive validation, the applicable criteria should be met in all three areas.
[†] Includes administration of hepatitis B vaccine within 24 hours of birth, followed by ≥2 additional doses (according to national schedule); coverage targets apply to birth dose and HepB3.
[§] Hepatitis B endemicity levels based on the prevalence of HBsAg: low (<2.0%), intermediate (2.0%–7.9%), and high (>8.0%).

Summary

What is already known about this topic?

In 2019, 14 million persons in the World Health Organization European Region (EUR) were chronically infected with hepatitis B virus.

What is added by this report?

During 2016–2019, EUR made substantial progress towards hepatitis B control. Of 53 countries in EUR, 35, 19, and 17 countries met coverage targets for 3 doses of hepatitis B vaccine, the birth dose, and for hepatitis B screening of pregnant women, respectively. Two countries (Italy and the Netherlands) have achieved hepatitis B control.

What are the implications for public health practice?

Improving hepatitis B vaccination coverage, screening of pregnant women, and conducting hepatitis B seroprevalence assessments can help EUR to accelerate progress and document achievement of hepatitis B control targets.

Implementing the regional guidance on interventions to mitigate the impact of COVID-19 on immunization programs can help countries maintain or improve HepB vaccination coverage and accelerate progress toward the regional goal (*10*).

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Disparities in COVID-19 Vaccination Coverage Among Health Care Personnel Working in Long-Term Care Facilities, by Job Category, National Healthcare Safety Network — United States, March 2021

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Residents of long-term care facilities (LTCFs) and health care personnel (HCP) working in these facilities are at high risk for COVID-19–associated mortality. As of March 2021, deaths among LTCF residents and HCP have accounted for almost one third (approximately 182,000) of COVID-19–associated deaths in the United States (*1*). Accordingly, LTCF residents and HCP were prioritized for early receipt of COVID-19 vaccination and were targeted for on-site vaccination through the federal Pharmacy Partnership for Long-Term Care Program (*2*). In December 2020, CDC's National Healthcare Safety Network (NHSN) launched COVID-19 vaccination modules, which allow U.S. LTCFs to voluntarily submit weekly facility-level COVID-19 vaccination data.* CDC analyzed data submitted during March 1–April 4, 2021, to describe COVID-19 vaccination coverage among a convenience sample of HCP working in LTCFs, by job category, and compare HCP vaccination coverage rates with social vulnerability metrics of the surrounding community using zip code tabulation area (zip code area) estimates. Through April 4, 2021, a total of 300 LTCFs nationwide, representing approximately 1.8% of LTCFs enrolled in NHSN, reported that 22,825 (56.8%) of 40,212 HCP completed COVID-19 vaccination.† Vaccination coverage was highest among physicians and advanced practice providers (75.1%) and lowest among nurses (56.7%) and aides (45.6%). Among aides (including certified nursing assistants, nurse aides, medication aides, and medication assistants), coverage was lower in facilities located in zip code areas with higher social vulnerability (social and structural factors associated with adverse health outcomes), corresponding to vaccination disparities present in the wider community (*3*). Additional efforts are needed to improve LTCF immunization policies and practices, build confidence in COVID-19 vaccines, and promote COVID-19 vaccination. CDC and partners have prepared education and training resources to help educate HCP and promote COVID-19 vaccination coverage among LTCF staff members.§

LTCFs voluntarily reported HCP COVID-19 vaccination data using the NHSN COVID-19 vaccination modules through April 4, 2021. Coverage was assessed among LTCF HCP, stratified by job category (denominator).¶ Vaccinated HCPs (numerator) were those who were vaccinated at the facility or had documentation of receipt of COVID-19 vaccination elsewhere. The module required responses for the total number of HCP and their COVID-19 vaccinations status; subtotals by job categories were optional. Facilities were included for analysis only if they had reported nonzero values for the number of HCP and their vaccination status by every job category in the most recent weekly report submitted through NHSN during March 1–April 4, 2021. Reported HCP job categories were 1) physicians and advanced practice providers (residents, fellows, advanced practice nurses, and physician assistants); 2) therapists (respiratory, occupational, physical, speech, and music therapists, and therapy assistants); 3) ancillary services employees (environmental, laundry, maintenance, and dietary services); 4) nurses (registered nurses and licensed practical/vocational nurses); 5) aides (certified nursing assistants, nurse aides, medication aides, and medication assistants); and 6) other HCP (personnel not included in the preceding categories, including contract staff members, students, and other nonemployees).

Vaccination coverage for aides, the largest HCP category, was further assessed by social indicators within the zip code area of the LTCF, including median income and percentage of adults belonging to racial and ethnic minority groups, percentage living in poverty, and percentage without a high school diploma; social indicator data were obtained from the 2019 American Community Survey.** Tertiles (higher, moderate, and low) were calculated for each indicator based on the national distribution of zip code areas; facilities in the corresponding zip code area were assigned to each tertile. Because this was a convenience sample, with likely intra-facility or locality clustering in vaccination behavior, confidence intervals were not calculated, nor was statistical testing for percentages performed. One LTCF was excluded from this analysis because a corresponding zip code area was missing. Data were downloaded

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* https://www.medrxiv.org/content/10.1101/2021.05.14.21257224v1
† Completed COVID-19 vaccination was defined as 2 doses of Pfizer-BioNTech or Moderna or 1 dose of the Janssen (Johnson & Johnson) COVID-19 vaccines. https://www.cdc.gov/vaccines/covid-19/clinical-considerations/covid-19-vaccines-us.html
§ https://www.cdc.gov/vaccines/covid-19/toolkits/long-term-care/index.html

¶ https://www.cdc.gov/nhsn/forms/57.219-p.pdf
** https://www.census.gov/programs-surveys/acs

for analysis on April 7, 2021, and all analyses were conducted using SAS statistical software (version 9.4; SAS Institute). This activity was reviewed by CDC and conducted consistent with applicable federal law and CDC policy.[††]

During March 1–April 4, a total of 1,898 LTCFs voluntarily reported HCP COVID-19 vaccination data, including 300 (16%) facilities from 47 states[§§] that reported numbers for HCP and vaccination status for every job category in the most recent weekly report submitted through NHSN (Supplementary Table 1, https://stacks.cdc.gov/view/cdc/108137). Among 40,212 HCP from these LTCFs, 22,825 (56.8%) had completed COVID-19 vaccination (Table 1). In this convenience sample, the group with the highest percentage of reported fully vaccinated HCP were physicians and other advanced practice providers (75.1%), followed by therapists (69.2%), ancillary services employees (58.5%), nurses (56.7%), and aides (45.6%). Coverage was 68.5% among other HCP not reported in these categories (e.g., students and contractors). The proportion of persons who declined COVID-19 vaccination ranged from 11.1% among physicians to 33.2% among aides. Reported recent COVID-19 infections ranged from 0.7% among physicians to 3.0% among aides. The percentage of aides who were completely vaccinated was lower among those working in facilities located in zip code areas with higher proportions of ethnic and racial minorities (43.5% versus 50.5%), lower household median income (40.5% versus 48.1%), higher poverty (42.4% versus 49.2%), and lower high school completion (42.2% versus 49.3%) (Table 2).

Discussion

In March 2021, data from a convenience sample of 300 LTCFs across the United States indicated disparities in HCP COVID-19 vaccination coverage, with a 30 percentage-point difference in coverage between physicians and other advanced practice providers (75.1%) and aides (45.6%). Among aides, lower vaccination coverage was observed in those facilities located in more socially vulnerable zip code areas. Together, these data suggest that vaccination disparities among job categories likely mirror social disparities in general as well as disparities in the surrounding communities. These findings suggest that vaccination promotion and outreach efforts focused on socially vulnerable and marginalized groups and communities could help address inequities (4).

One concern is that nurses and aides in this sample, who have the most patient contact, had the lowest vaccination coverage. COVID-19 outbreaks have occurred in LTCFs in which residents were highly vaccinated, but transmission

[††] 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.
[§§] No LTCFs were included from Delaware, Minnesota, or Montana.

TABLE 1. COVID-19 vaccination coverage of health care professionals, by job category, in 300 long-term care facilities reporting to the National Healthcare Safety Network — United States, March 1–April 4, 2021

		No. (%)		
HCP job category	No. of HCP	Fully vaccinated	Declined vaccination	Recent SARS-CoV-2 infection
Aides*	12,670	5,778 (45.6)	4,204 (33.2)	382 (3.0)
Ancillary services employees[†]	9,116	5,337 (58.5)	2,374 (26.0)	172 (1.9)
Nurses[§]	8,622	4,887 (56.7)	2,359 (27.4)	196 (2.3)
Therapists[¶]	3,028	2,095 (69.2)	527 (17.4)	51 (1.7)
Physicians and advanced practice providers**	1,284	964 (75.1)	142 (11.1)	9 (0.7)
Other HCP[††]	5,492	3,764 (68.5)	794 (14.5)	78 (1.4)
All staff members	**40,212**	**22,825 (56.8)**	**10,400 (25.9)**	**888 (2.2)**

Abbreviation: HCP = health care personnel.
* Certified nursing assistants, nurse aides, medication aides, and medication assistants.
[†] Environmental, laundry, maintenance, and dietary services.
[§] Registered nurses and licensed practical/vocational nurses.
[¶] Respiratory, occupational, physical, speech, and music therapists, and therapy assistants.
** Physicians, residents, fellows, advanced practice nurses, and physician assistants.
[††] Personnel not included in the preceding categories, including contract staff members, students, and other nonemployees.

TABLE 2. COVID-19 vaccination coverage among aides,* by selected social vulnerability metrics and tertile — United States, March 1–April 4, 2021

	Vulnerability tertile, no. vaccinated/total (%)		
Social vulnerability metric	Higher	Moderate	Low
Percentage in racial/ethnic minority group[†]	2,794/6,416 (43.5)	2,379/5,056 (47.1)	605/1,198 (50.5)
Median income[§]	1,245/3,072 (40.5)	1,843/4,005 (46.0)	2,690/5,593 (48.1)
Percentage living in poverty[¶]	1,865/4,397 (42.4)	1,705/3,783 (45.1)	2,208/4,490 (49.2)
Percentage without high school diploma**	1,577/3,739 (42.2)	1,997/4,460 (44.8)	2,204/4,471 (49.3)

* Certified nursing assistants, nurse aides, medication aides, and medication assistants.
[†] Higher vulnerability tertile: zip code areas with >17.4% persons belonging to racial/ethnic minorities; moderate: 17.4%–96.0%; low: <4.0%.
[§] Higher vulnerability tertile: zip code areas with household median income ≤$48,770; moderate: median income >$48,770 through ≤64,741; low: median income >$64,741.
[¶] Higher vulnerability tertile: zip code areas with >15.5% of households living under the federal poverty line; moderate: 15.5%–8.1%; low: ≤8.0%.
** Higher vulnerability tertile: zip code areas with >13.6% of persons aged ≥25 years without a high school diploma or equivalent; moderate: 13.6%–6.9%; low: <6.9%.

occurred through unvaccinated staff members (5). This finding also has equity implications: national data indicated that aides in nursing homes are disproportionately women and members of racial and ethnic minority groups, with median hourly wages of $13–$15 per hour[¶¶] (6); aides are also more likely to have underlying conditions that put them at risk for adverse outcomes from COVID-19 (7). As vaccination was

[¶¶] https://phinational.org/wp-content/uploads/2020/01/Its-Time-to-Care-2020-PHI.pdf

Summary

What is already known about this topic?

Residents of long-term care facilities (LTCFs) and health care personnel (HCP) who work in these facilities were prioritized for early COVID-19 vaccination. Achieving high coverage in this setting is critical to preventing additional outbreaks.

What is added by this report?

During March 2021, 300 LTCFs reported COVID-19 vaccination coverage for their HCP. COVID-19 vaccination coverage was highest among physicians (75.1%) and lowest among aides (45.6%). Vaccination coverage among aides was lower in facilities located in zip code areas with higher levels of social vulnerability.

What are the implications for public health practice?

Additional efforts to improve LTCF immunization practices, build confidence in COVID-19 vaccines, and promote COVID-19 vaccination are needed.

made available on site and lower vaccination rates reflected higher declination rates, vaccine hesitancy might have been an important contributor to undervaccination in these facilities.

The finding that vaccination coverage among aides was lower among those working at LTCFs located in zip code areas with higher social vulnerability is consistent with an earlier analysis of overall county-level vaccination coverage by indices of social vulnerability (*3*); however, similar patterns among LTCF staff members are notable because on-site vaccination removed a number of barriers to vaccination, including travel, scheduling, and need to take time off from work.

The findings in this report are subject to at least five limitations. First, facilities included in this analysis had completed a series of optional fields in a voluntary NHSN COVID-19 vaccination module. The 300 facilities presented represent <2% of the >17,000 LTCFs enrolled in NHSN; thus, the findings from this nonprobability–based convenience sample are not generalizable to all LTCFs. Second, LTCFs reported aggregate weekly data, preventing person-level analysis (e.g., by race/ethnicity) and possibly resulting in duplication of reports, if, for example, HCP work at multiple facilities. Third, data on staff member numbers and numbers vaccinated were self-reported by LTCFs and were not independently validated. Fourth, excluding LTCFs reporting zero values might exclude LTCFs with no vaccine coverage (as opposed to nonreporting), thus inflating the estimated vaccination coverage. Finally, this analysis captured vaccination patterns during March 2021, when most facilities had completed on-site vaccination through the federal pharmacy program. Increasing availability and acceptance of COVID-19 vaccinations in subsequent months might have resulted in higher coverage. However, higher staff

member turnover in some job categories, including aides, relative to other job categories, might lead to changes in vaccination coverage.

Low vaccination coverage among LTCF staff members highlights disparities across HCP groups, and in the surrounding communities. Additional efforts are warranted to improve LTCF immunization policies and vaccination practices, build HCP confidence in COVID-19 vaccines, and encourage vaccination among persons who have been economically or socially marginalized. On May 11, 2021 the Centers for Medicare & Medicaid Services (CMS) published an interim final rule requiring LTCFs to educate HCP on COVID-19 vaccines, offer vaccination, and report vaccination status to NHSN*** (*8*). CDC and partners have prepared education and training resources to help educate HCP and promote vaccination coverage among LTCF staff members.[†††] Finally, LTCFs could consider best practices from influenza campaigns, which found that employer vaccination requirements were associated with the highest vaccination coverage (*9*).

*** CDC and CMS data are available at the following: https://www.cdc.gov/nhsn/covid19/ltc-vaccination-dashboard.html and https://data.cms.gov/covid-19/covid-19-nursing-home-data

[†††] https://www.cdc.gov/vaccines/covid-19/toolkits/long-term-care/index.html

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SARS-CoV-2 Infection in Public School District Employees Following a District-Wide Vaccination Program — Philadelphia County, Pennsylvania, March 21–April 23, 2021

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The School District of Philadelphia reopened for in-school instruction the week of March 21, 2021, and required weekly testing for SARS-CoV-2, the virus that causes COVID-19, for all employees returning to in-school responsibilities. The resumption of in-school instruction followed a mass vaccination program using the Pfizer-BioNTech 2-dose vaccine offered under a partnership between the Philadelphia Department of Public Health and Children's Hospital of Philadelphia to all 22,808 School District of Philadelphia employees during February 23–April 3, 2021.* The subsequent mandatory testing program provided an opportunity to assess the percentage of positive BinaxNow point-of-care antigen tests (Abbott Laboratories) identified among school staff members based on their self-reported vaccination status (i.e., received zero, 1, or 2 vaccine doses) at the time of testing. During the initial 5 weeks after schools reopened, 34,048 screening tests were performed. Overall, 0.70% of tests returned a positive result. The percentage of positive test results was lower among persons who reported receipt of 2 vaccine doses (0.09%) compared with those who reported receipt of 1 dose (1.21%) or zero doses (1.76%) (p<0.001) representing a 95% reduction in percentage of positive SARS-CoV-2 test results among persons reporting receipt of 2 compared with zero doses of Pfizer-BioNTech vaccine. Vaccination of school staff members has been highlighted as an important strategy to maximize the safety of in-person education of K–12 students this fall (*1*). These findings reinforce the importance of promoting COVID-19 vaccination among school staff members before commencement of the 2021–22 school year.

The School District of Philadelphia provided a roster of all school staff members who were invited to participate in the February 23–April 3 vaccination program. The roster included employee age, sex, and race; ethnicity of employees was not provided by the school district but was self-reported at the time of vaccination. School-based testing of all School District of Philadelphia staff members working within the district's buildings, including those who did and did not have regular contact with students, was launched the week of March 21, 2021; mandatory weekly screening testing programs were conducted by trained nurses and designated staff members using point-of-care antigen tests. All persons reported the presence or absence of symptoms at the time of testing. Both symptomatic and asymptomatic persons who received a positive SARS-CoV-2 test result were excluded from work and required to self-isolate; asymptomatic persons were also encouraged to undergo confirmatory testing using a nucleic acid amplification test; however, no data on testing conducted outside of this school-based testing program was reported. Antigen test results were automatically reported through the secure mobile application PARapidTest (Southwest Texas Regional Advisory Council [STRAC]) to Pennsylvania's National Electronic Disease Surveillance System.†

Deidentified data were analyzed to determine the percentage of SARS-CoV-2 positive test results among staff members who did not report recent exposure to a symptomatic or asymptomatic person infected with SARS-CoV-2, overall and by vaccination status. Exposure history was obtained from responses to questions asked of staff members before testing. Self-reported vaccination status was collected at the time of testing and included vaccine doses received through the county school vaccination program as well as outside the program. Because only 2-dose COVID mRNA vaccines were authorized for use by the Food and Drug Administration at the time of the study, vaccination status was categorized by self-reported number of doses of vaccine received (i.e., zero, 1, or 2 doses) at the time of testing. Information was not collected on whether ≥2 weeks had passed since receipt of the second dose, so some persons who had received 2 vaccine doses might not have been optimally protected at the time of testing.

Available data were used to calculate the percentages of staff members who were vaccinated through the program as of April 3, 2021, overall, and within each demographic group. Chi-square tests were performed to determine whether vaccination coverage of school staff members differed by demographic characteristics. Results of all school-based testing conducted during March 21–April 23, 2021, were used to

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* The mass vaccination program was the principal opportunity offered within the county for school employees in the region to receive COVID-19 vaccine. Some persons aged >65 years or with chronic conditions might have obtained vaccines available to Philadelphia residents through these other priority designations, although supply at that time was scarce.

† The application did not track serial testing of individual persons, although persons who received positive test results were not retested in subsequent weeks during this study period.

calculate the percentage of asymptomatic persons with positive test results, overall and by vaccination status. Risk ratios (RRs) comparing vaccinated with unvaccinated groups were calculated. Statistical significance was set at $\alpha = 0.05$ for all comparisons. All analyses were conducted using SAS software (version 9.4; SAS Institute). All data collection and analysis for the School District of Philadelphia vaccination and screening testing programs were in accordance with the authorities of local public health jurisdictions for emergency public health response activities and received a nonresearch determination.

Among 22,808 district employees eligible for COVID-19 vaccination, 10,700 (46.9%) received ≥1 dose through the program; 46.1% of staff members received both doses of vaccine through the program (Table 1). Approximately one half (51.9%) of eligible staff members aged 40–65 years were vaccinated through the program; coverage was 44.5% among persons aged 17–39 years and 27.9% among those aged >65 years. The highest coverage with ≥1 dose (95.1%) was among Asian or Pacific Islander persons, followed by White persons (65.3%). Approximately one third (32.6%) of Black or African American persons received ≥1 dose through the program. Coverage was higher among Hispanic or Latino persons (52.1%) than among persons of other ethnic groups (46.6%) and was similar among men and women.

During March 21–April 23, the weekly number of tests performed increased from 6,215 to 12,232. By April 23, 54% of 22,808 school staff members, representing persons on-site for work responsibilities and including persons both with and without symptoms, had received 34,048 tests (Table 2), 238 (0.70%) of which were positive for SARS-CoV-2. In total, 21,083 (62%) tests were performed for persons reporting receipt of 2 vaccine doses, 1,737 (5.1%) for persons reporting receipt of 1 dose, and 11,228 (33.0%) for those who had received zero doses. Among 2-dose, 1-dose, and zero-dose vaccine recipients, 0.09%, 1.21%, and 1.76% of test results, respectively, were positive (p<0.001), representing a 95% lower percentage of positive test results among staff members who received 2 doses compared with those who were unvaccinated (RR = 0.04; 95% confidence interval [CI] = 0.02–0.07). Among staff members who did not report symptoms at the time of testing, the percentage of positive tests was lower among persons who received both vaccine doses (0.09%) than among those who had received 1 dose (0.82%) or zero doses (1.22%) (p<0.001), representing a 93% reduction in percentage of positive test results among asymptomatic school staff members who had received 2, versus zero, vaccine doses (RR = 0.07; 95% CI = 0.04–0.11). Compared with zero-dose recipients, the percentage of positive test results was 31% lower among

TABLE 1. Characteristics of School District of Philadelphia staff members participating in a county vaccination program — Philadelphia County, Pennsylvania, February 23–April 3, 2021

Characteristic	No. of staff members eligible for vaccination	No. of staff members vaccinated through school program (%)*	p-value
Total	**22,808**	**10,700 (46.9)**	**NA**
Age group, yrs			
17–39	8,709	3,879 (44.5)	Ref
40–65	12,452	6,467 (51.9)	<0.001[†]
>65	1,170	327 (27.9)[§]	<0.001[†]
Missing	477	27 (5.6)	<0.001[†]
Race			
Black or African American	9,842	3,211 (32.6)	Ref
White or Caucasian	9,430	6,160 (65.3)	<0.001[†]
Asian or Pacific Islander	364	346 (95.1)	<0.001[†]
Native American	38	18 (47.4)	0.053
Other or unknown	3,134	965 (30.7)	0.056
Ethnicity			
Hispanic or Latino	1,232	642 (52.1)	Ref
Not Hispanic or Latino	21,576	10,058 (46.6)	<0.001[†]
Sex[¶]			
Female	16,501	7,762 (47.0)	Ref
Male	6,289	2,937 (46.7)	0.65

Abbreviations: NA = not applicable; Ref = referent group.
* Persons who received ≥1 dose of the Pfizer-BioNTech COVID-19 vaccine.
[†] Indicates chi-square significance (p-value <0.05).
[§] There was no mechanism to confirm receipt of vaccine via sources other than the school vaccination program. This analysis includes only persons who received COVID-19 vaccine through the school vaccination campaign.
[¶] Excludes 18 persons for whom sex was not reported.

TABLE 2. SARS-CoV-2 BinaxNow antigen tests performed during weekly testing and results received from School District of Philadelphia staff members following reopening of schools for in-person instruction, by self-reported vaccination status — Philadelphia County, Pennsylvania, March 21–April 23, 2021

Group	No. of tests performed	No. of positive results (%)	Risk ratio (95% CI)
All persons*			
Received 2 vaccine doses	21,083	19 (0.09)	0.04 (0.02–0.07)
Received 1 vaccine dose	1,737	21 (1.21)	0.69 (0.44–1.07)
Unvaccinated	11,228	198 (1.76)	Ref
Total	**34,048**	**238 (0.70)**	**NA**
Asymptomatic, nonexposed persons			
Received 2 vaccine doses	21,019	18 (0.09)	0.07 (0.04–0.11)
Received 1 vaccine dose	1,717	14 (0.82)	0.67 (0.39–1.16)
Unvaccinated	11,007	134 (1.22)	Ref
Total	**33,743**	**166 (0.49)**	**NA**

Abbreviations: CI = confidence interval; NA = not applicable; Ref = referent group.
* Includes persons who did and did not report symptoms before testing.

all 1-dose recipients and 33% lower among asymptomatic 1-dose recipients; however, the differences were not statistically significant between these two groups.

Discussion

Following school reopening in Philadelphia County, Pennsylvania, on March 21, 2021, weekly point-of-care SARS-CoV-2 testing identified a 95% lower percentage of positive test results among school staff members who had received both doses of Pfizer-BioNtech vaccine compared with those among unvaccinated staff members. These results occurred when the city's daily COVID-19 incidence was 29–33 cases per 100,000 population, and approximately 40% of strains sequenced from the region were the B.1.1.7 (Alpha) lineage.[§] The lower percentage of positive SARS-CoV-2 test results among vaccinated staff members supports ongoing efforts to promote COVID-19 vaccination for all school employees in advance of the upcoming 2021–22 school year (1).

Disparities in vaccination coverage were observed, particularly among younger staff members and Black or African American persons. Targeted health education and outreach, particularly focused on these populations, might help increase vaccination coverage.

The percentage of positive test results for persons who had received 1 vaccine dose was lower than that among unvaccinated persons, but higher than that for 2-dose recipients, which underscores the importance of completing the 2-dose COVID-19 mRNA vaccination series. Current CDC recommendations indicate that fully vaccinated persons with no known exposure to COVID-19 and no COVID-19–compatible symptoms can be exempted from routine testing programs (2). Therefore, schools with high rates of staff member vaccination coverage might be able to implement in-person learning without the need for routine testing programs. Nevertheless, inclusion of asymptomatic vaccinated persons in routine screening programs might be necessary in settings of high levels of community transmission, particularly if vaccine escape variants or evidence of waning immunity emerge[¶] (3).

The findings in this report are subject to at least six limitations. First, weekly testing possibly failed to identify persons with more significant clinical disease who were tested outside the screening program; such ascertainment bias might underestimate the impact. Second, unmeasured differences probably exist between vaccinated and unvaccinated staff members in their risk for SARS-CoV-2 exposure in community settings, incidence of previous infection, and adherence to mitigation practices (e.g., using masks and physical distancing), which might confound the findings in this study. Third, because only aggregated data from the school district's testing program were available, it is not possible to examine the impact of vaccination on asymptomatic infection in subpopulations of school

Summary

What is already known about this topic?

Vaccination of school staff members has been highlighted as an important strategy to maximize the safety of in-person education of K–12 students this fall.

What is added by this report?

Weekly SARS-CoV-2 antigen screening tests required of all employees returning for in-school instruction in the School District of Philadelphia found a 95% lower percentage of positive test results among persons who reported receipt of 2 doses of COVID-19 mRNA vaccine (0.09%) than among those who were unvaccinated (1.77%).

What are the implications for public health practice?

Efforts to promote COVID-19 vaccination among school staff members before the upcoming 2021–22 school year will be foundational to ensure a safe learning environment.

staff members. Fourth, self-report of vaccination status at the time of testing can be subject to social desirability bias that might have differentially misclassified unvaccinated persons among persons reporting vaccinations. Fifth, a higher proportion of persons reported having been vaccinated before testing than were vaccinated during the county school vaccination program; previous vaccination of staff members with other high-risk characteristics (e.g., age ≥65 years or having chronic conditions) likely contributed to this finding. Although these differences might have inflated the estimates of vaccine receipt across specific demographic groups, they would not have affected the validity of testing results or the differences in the percentage of positive test results. Finally, information was not collected on whether ≥2 weeks had passed after receipt of the second vaccine dose; thus, some persons who had received 2 vaccine doses might not have been optimally protected at the time of testing.

During a period of relatively high community transmission, weekly SARS-CoV-2 antigen screening testing of school staff members in the School District of Philadelphia, one of the country's largest public school districts (4), revealed significantly fewer infections among vaccinated school staff members compared with those who were unvaccinated. Efforts to promote COVID-19 vaccination among school staff members before the upcoming 2021–22 school year will be foundational to ensure a safe learning environment (1).

[§] https://www.biorxiv.org/content/10.1101/2021.04.21.440801v1
[¶] https://arxiv.org/abs/2008.03283

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Guidance for Implementing COVID-19 Prevention Strategies in the Context of Varying Community Transmission Levels and Vaccination Coverage

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COVID-19 vaccination remains the most effective means to achieve control of the pandemic. In the United States, COVID-19 cases and deaths have markedly declined since their peak in early January 2021, due in part to increased vaccination coverage (*1*). However, during June 19–July 23, 2021, COVID-19 cases increased approximately 300% nationally, followed by increases in hospitalizations and deaths, driven by the highly transmissible B.1.617.2 (Delta) variant[*] of SARS-CoV-2, the virus that causes COVID-19. Available data indicate that the vaccines authorized in the United States (Pfizer-BioNTech, Moderna, and Janssen [Johnson & Johnson]) offer high levels of protection against severe illness and death from infection with the Delta variant and other currently circulating variants of the virus (*2*). Despite widespread availability, vaccine uptake has slowed nationally with wide variation in coverage by state (range = 33.9%–67.2%) and by county (range = 8.8%–89.0%).[†] Unvaccinated persons, as well as persons with certain immunocompromising conditions (*3*), remain at substantial risk for infection, severe illness, and death, especially in areas where the level of SARS-CoV-2 community transmission is high. The Delta variant is more than two times as transmissible as the original strains circulating at the start of the pandemic and is causing large, rapid increases in infections, which could compromise the capacity of some local and regional health care systems to provide medical care for the communities they serve. Until vaccination coverage is high and community transmission is low, public health practitioners, as well as schools, businesses, and institutions (organizations) need to regularly assess the need for prevention strategies to avoid stressing health care capacity and imperiling adequate care for both COVID-19 and other non–COVID-19 conditions. CDC recommends five critical factors be considered to inform local decision-making: 1) level of SARS-CoV-2 community transmission; 2) health system capacity; 3) COVID-19 vaccination coverage; 4) capacity for early detection of increases in COVID-19 cases;

and 5) populations at increased risk for severe outcomes from COVID-19. Among strategies to prevent COVID-19, CDC recommends all unvaccinated persons wear masks in public indoor settings. Based on emerging evidence on the Delta variant (*2*), CDC also recommends that fully vaccinated persons wear masks in public indoor settings in areas of substantial or high transmission. Fully vaccinated persons might consider wearing a mask in public indoor settings, regardless of transmission level, if they or someone in their household is immunocompromised or is at increased risk for severe disease, or if someone in their household is unvaccinated (including children aged <12 years who are currently ineligible for vaccination).

The principal mode by which persons are infected with SARS-CoV-2 is through exposure to respiratory fluids carrying infectious virus.[§] The risk for SARS-CoV-2 transmission in outdoor settings is low (*4,5*). CDC recommends that public health practitioners and organizations prioritize prevention strategies for indoor settings. No one strategy is sufficient to prevent transmission, and multiple interventions should be used concurrently to reduce the spread of disease (*6*). Proven effective strategies against SARS-CoV-2 transmission, beyond vaccination, include using masks consistently and correctly (*7,8*), maximizing ventilation both through dilution (*9,10*) and filtration (*11*) of air, and maintaining physical distance and avoiding crowds (*12,13*). Basic public health measures such as staying home when sick, handwashing, and regular cleaning of high-touch surfaces should also be encouraged.

Level of SARS-CoV-2 Community Transmission

A person's risk for SARS-CoV-2 infection is directly related to the risk for exposure to infectious persons, which is largely determined by the extent of SARS-CoV-2 circulation in the surrounding community.[¶] CDC recommends assessing the level of community transmission using, at a minimum, two metrics: new COVID-19 cases per 100,000 persons in the last 7 days and percentage of positive SARS-CoV-2 diagnostic nucleic acid amplification tests in the last 7 days. For each of these metrics, CDC classifies transmission values as low, moderate, substantial, or high (Table). If the values for each

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[*] Point-in-time information is available from CDC COVID Data Tracker. https://covid.cdc.gov/covid-data-tracker/#variant-proportions

[†] Persons are considered fully vaccinated if ≥2 weeks have elapsed following receipt of the second dose in a 2-dose series of Moderna or Pfizer-BioNTech mRNA COVID-19 vaccine, or ≥2 weeks following receipt of 1-dose of Janssen (Johnson & Johnson) vaccine. Data are available from CDC COVID Data Tracker. https://covid.cdc.gov/covid-data-tracker

[§] https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/sars-cov-2-transmission.html

[¶] https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/transmission_k_12_schools.html

TABLE. CDC core indicators of and thresholds for community transmission levels of SARS-CoV-2

Indicator	Transmission level			
	Low	Moderate	Substantial	High
New cases per 100,000 persons in the past 7 days*	0–9.99	10.00–49.99	50.00–99.99	≥100.00
Percentage of positive nucleic acid amplification tests in the past 7 days[†]	<5.00	5.00–7.99	8.00–9.99	≥10.00

* Number of new cases in the county (or other administrative level) in the past 7 days divided by the population in the county (or other administrative level) multiplied by 100,000.
[†] Number of positive tests in the county (or other administrative level) during the past 7 days divided by the total number of tests performed in the county (or other administrative level) during the past 7 days. https://www.cdc.gov/coronavirus/2019-ncov/lab/resources/calculating-percent-positivity.html

of these two metrics differ (e.g., one indicates moderate and the other low), then the higher of the two should be used for decision-making. CDC recommends the geographic unit of analysis be county or core-based statistical area. In rural areas with low population densities, multiple counties might need to be combined to increase available data so that reliable inferences can be made. The level of SARS-CoV-2 transmission for any given area can change rapidly and should be reassessed at least weekly to ensure that the necessary layered prevention strategies are in place. In areas of substantial or high transmission, CDC recommends community leaders encourage vaccination and universal masking in indoor public spaces in addition to other layered prevention strategies to prevent further spread. Updated community transmission levels, as well as other indicators related to COVID-19, are available by county and state at the online CDC COVID Data Tracker** and are already used by many public health departments.

Health System Capacity

Data on usage of clinical care resources to manage patients with COVID-19 reflect underlying community disease incidence and can signal when urgent implementation of layered prevention strategies might be necessary to prevent overloading the health care system. Strains on critical care capacity can increase COVID-19 mortality (14,15) while decreasing the availability and use of health care resources for non–COVID-19 related medical care (16,17). CDC recommends public health departments and health care institutions monitor the available number and fraction of staffed inpatient and intensive care unit beds and develop thresholds, based on local health care system usage and remaining capacity, that would trigger community-wide application of layered prevention strategies.

COVID-19 Vaccination Coverage

Monitoring vaccination coverage in communities and organizations is recommended by CDC to gauge progress, focus vaccination efforts on populations whose coverage is low, and inform the need for additional prevention strategies. As of

July 23, 2021, the proportion of the total U.S. population who is fully vaccinated is 48.9%.[††] Of the 2,945 (91.4%) U.S. counties reporting, vaccination coverage is <40% in 1,856 (63.0%) and 40%–49.9% in 672 (22.8%); only 417 (14.2%) of counties reported ≥50% COVID-19 vaccination coverage. Primary vaccination efforts should be accelerated in counties with low vaccination coverage. Public health practitioners should work with clinicians and community partners to build confidence in the vaccine and ensure equitable access.[§§] Organizations should establish supportive policies, such as allowing workers to receive vaccines during work hours or to take paid leave to get vaccinated at a community site, as well as offering flexible, nonpunitive sick leave options for employees.

Capacity for Early Detection of Increases in COVID-19 Cases

Certain populations are at high risk for exposure to, and thereby infection with, SARS-CoV-2. Such populations are especially well-suited for sentinel monitoring efforts to detect the early introduction and spread of COVID-19, particularly in areas with low vaccination coverage or where layered prevention strategies are not in use. CDC considers the capacity to monitor COVID-19 incidence in the following populations particularly useful due to their high risk of exposure or severe illness: students and staff members of kindergarten–grade 12 schools and institutions of higher education, health care workers, residents and staff members of long-term care facilities, incarcerated persons, homeless persons, and workers in high-density work sites (18–23).

Serial screening testing is an effective method to monitor for the early introduction and spread of COVID-19 (6). Low case detection rates can help demonstrate the effectiveness of current prevention strategies, thereby reducing barriers for returning to in-person learning and work. Rising case detection rates can serve as an early warning signal that prevention strategies need to be strengthened or added in the facility and the broader community. In addition, strategic serial testing can help stop transmission by rapidly identifying asymptomatic cases, which are estimated

** https://covid.cdc.gov/covid-data-tracker/#county-view

[††] CDC's COVID Data Tracker accessed July 23, 2021. https://covid.cdc.gov/covid-data-tracker/#vaccinations
[§§] https://www.cdc.gov/vaccines/covid-19/vaccinate-with-confidence.html

to be the source for at least 50% of SARS-CoV-2 transmission (*24,25*). With rapid identification, infectious persons can be isolated and contact tracing and quarantine can be promptly initiated to control further SARS-CoV-2 transmission.

Populations at Risk for Severe Outcomes from COVID-19

CDC recommends additional prevention strategies to safeguard populations at highest risk for severe outcomes from COVID-19, particularly in the context of the highly transmissible Delta variant. Unvaccinated persons remain at risk for infection, severe illness, and death. Advanced age, pregnancy, and an increasingly well-defined set of underlying medical conditions increase the risk for serious outcomes from COVID-19 among unvaccinated persons.⁹⁹ In addition, long-standing systemic health and social inequities have put members of certain racial and ethnic minority groups at increased risk for serious illness and mortality from COVID-19. Persons taking immunosuppressive medications, persons with hematologic cancers, and hemodialysis patients, among others, have shown reduced immunologic responses to COVID-19 mRNA vaccination and might remain at increased risk for severe COVID-19 following vaccination (*3*). CDC recommends unvaccinated persons should continue following all prevention strategies, including wearing a mask, until they are fully vaccinated. Immunocompromised persons should continue to take all recommended precautions until advised otherwise by their health care provider. Although COVID-19 vaccines authorized in the United States remain effective against severe outcomes from SARS-CoV-2 infection, a small proportion of persons who are fully vaccinated may become infected. Emerging evidence suggests that fully vaccinated persons who do become infected with the Delta variant are at risk for transmitting it to others (*2*), (CDC COVID-19 Response Team, unpublished data, 2021); therefore, CDC also recommends that fully vaccinated persons wear a mask in public indoor settings in areas of substantial or high transmission, and consider wearing a mask regardless of transmission level if they or someone in their household is immunocompromised or at increased risk for severe disease, or if someone in their household is unvaccinated (including children aged <12 years who are currently ineligible for vaccination). Public health practitioners and organizations should consider the characteristics of their local or setting-specific populations when determining whether to strengthen or add layered prevention strategies not only for effective disease control, but also to protect those persons at greatest risk for severe illness or death.

⁹⁹ https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/ underlying-evidence-table.html

Discussion

The most important public health action to end the pandemic remains increasing vaccination coverage, which saves lives, prevents illness, and reduces the spread of COVID-19. Effective COVID-19 prevention strategies are well documented and can help reduce community transmission until high vaccination coverage is achieved (*6*). To maximize protection of the community, prevention strategies should be strengthened or added if transmission worsens. Prevention strategies should only be relaxed or lifted after several weeks of continuous sustained improvement in the level of community transmission. In areas with low or no SARS-CoV-2 transmission and with testing capacity in place to detect early introduction or increases in spread of the virus, layered prevention strategies might be removed one at a time while monitoring closely for any evidence that COVID-19 cases are increasing.

The widespread availability and administration of COVID-19 vaccines has changed the trajectory of the pandemic in the United States and significantly reduced hospitalization and mortality among vaccinated persons (*1*). Increasing the proportion of eligible persons who are vaccinated reduces the risk for substantial or high community-wide transmission, which in turn reduces the risk for the emergence of new variants that could have the potential to overcome vaccine-induced immunity. However, vaccination coverage varies across the United States, and transmission risk remains considerable in areas with low vaccination coverage. Decisions to add or remove effective prevention strategies should be based on local data and public health recommendations. The emergence of more transmissible SARS-CoV-2 variants, including Delta, increases the urgency to expand vaccination coverage and for public health agencies and other organizations to collaboratively monitor the status of the pandemic in their communities and continue to apply layered prevention strategies to minimize preventable illness and death.

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Summary

What is already known about this topic?

COVID-19 vaccines authorized in the United States are effective against severe illness and death from SARS-CoV-2 infection; however, current U.S. coverage is uneven. Implementation of layered prevention strategies reduces SARS-CoV-2 transmission.

What is added by this report?

Given the spread of the highly transmissible Delta variant, local decision-makers should assess the following factors to inform the need for layered prevention strategies across a range of settings: level of SARS-CoV-2 community transmission, health system capacity, vaccination coverage, capacity for early detection of increases in COVID-19 cases, and populations at risk for severe outcomes from COVID-19.

What are the implications for public health practice?

Although increasing COVID-19 vaccination coverage remains the most effective means to achieve control of the pandemic, additional layered prevention strategies will be needed in the short-term to minimize preventable morbidity and mortality.

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QuickStats

Percentage* of Adults Aged ≥18 Years With Fair or Poor Health,[†] by Urbanization Level[§] and Age Group — National Health Interview Survey, United States, 2019[¶]
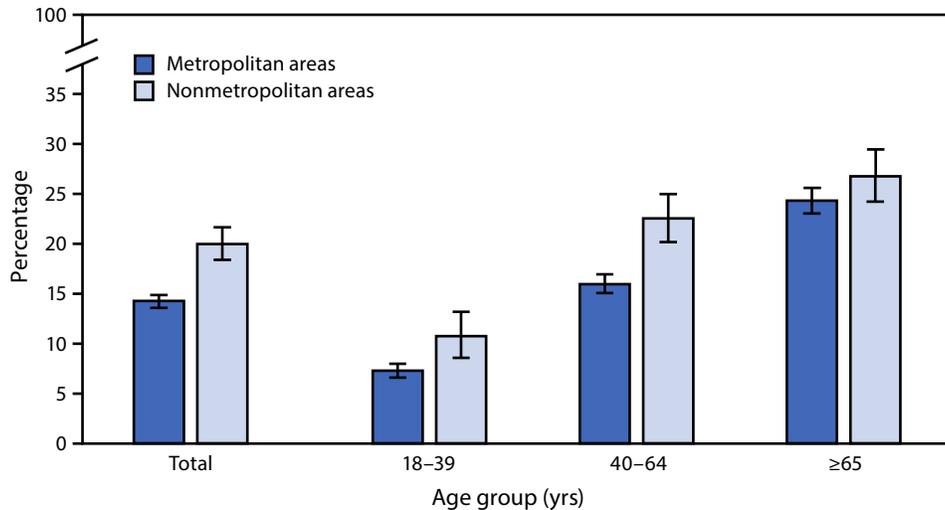
* With 95% confidence intervals indicated by error bars.
[†] Based on a response to the question, "Would you say your health in general is excellent, very good, good, fair, or poor?"
[§] Urbanization level is based on the Office of Management and Budget's February 2013 delineation of metropolitan statistical areas (MSAs), in which each MSA must have at least one urbanized area of ≥50,000 inhabitants. Areas with <50,000 inhabitants are grouped into the nonmetropolitan category.
[¶] Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population.

In 2019, the percentage of adults aged ≥18 years reported to be in fair or poor health was higher among those living in nonmetropolitan areas (20.3%) than among those living in metropolitan areas (14.5%). Percentages in fair or poor health were higher in nonmetropolitan areas for those aged 18–39 years (10.9% versus 7.4%) and 40–64 years (22.9% versus 16.2%), but the difference by urbanization level did not reach statistical significance for adults aged ≥65 years (27.2% versus 24.7%). The percentage reporting fair or poor health increased with age in both nonmetropolitan and metropolitan areas.

Source: National Center for Health Statistics, National Health Interview Survey, 2019. https://www.cdc.gov/nchs/nhis.htm

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