Considerations for Use of PCV15 and PCV20 in U.S. Adults

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Pneumococcal Vaccines Work Group

Advisory Committee on Immunization Practices

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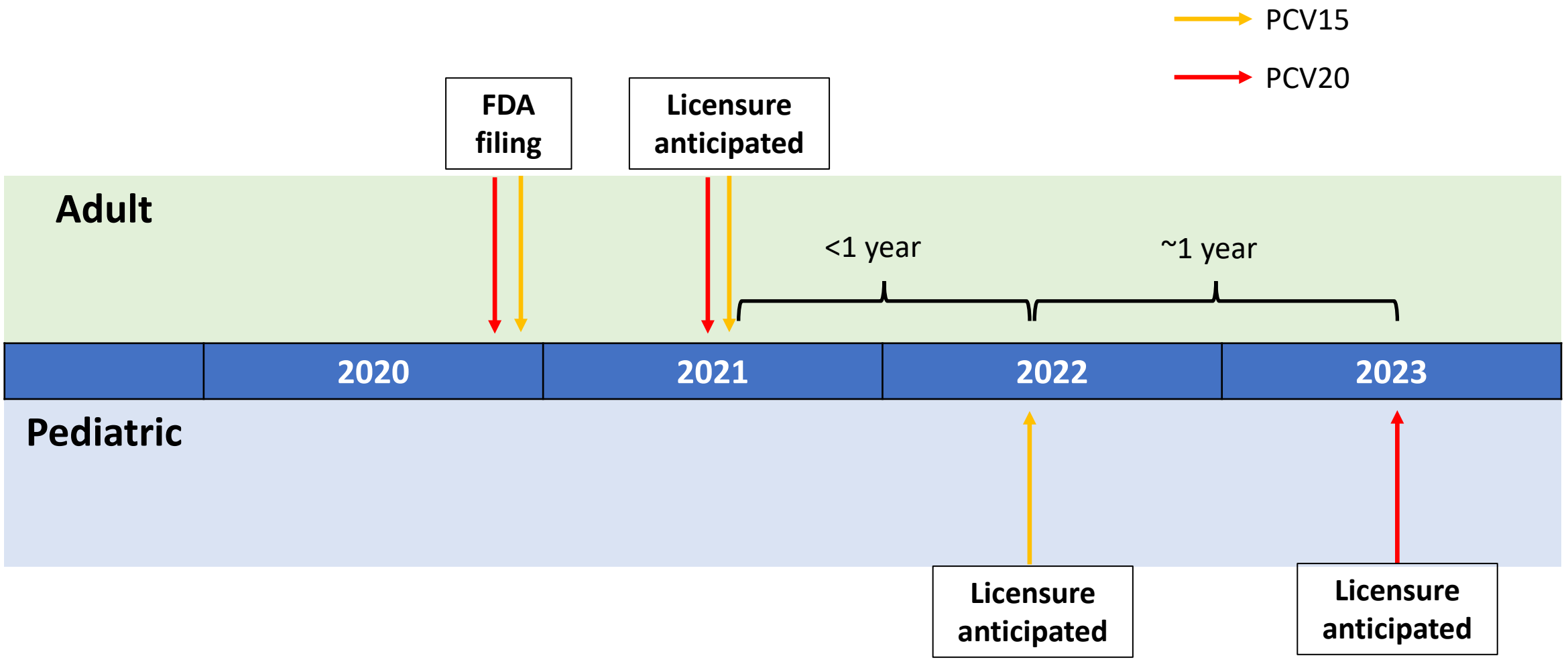
What We Learned from Pneumococcal Conjugate Vaccine (PCV) Use in the United States

- Introduction of PCV in children has reduced vaccine-preventable pneumococcal disease burden in adults

- Population level impact after PCV13 was recommended for all adults aged ≥65 years in 2014:
  - Reductions in PCV13-type pneumococcal pneumonia incidence were documented
  - No impact on PCV13-type invasive pneumococcal disease was observed

- Vaccine coverage after PCV13 was recommended in all adults with immunocompromising conditions in 2012:
  - PCV13 coverage in adults aged ≥65 years did not increase until after the age-based recommendation was introduced

Anticipated Timeline of Licensure of New Pneumococcal Conjugate Vaccines (PCVs) in Adults and Children



Guiding Principles Proposed by the Work Group

- Decisions on policy options should be supported by best-available evidence
- Simplifying existing pneumococcal vaccine recommendations could help improve vaccine coverage among adults
- Disparities in pneumococcal disease burden and vaccine coverage should be reduced
- Timely recommendations for each new vaccine should be made after FDA licensure

Current adult pneumococcal vaccine recommendations are different by age- and risk- groups.

	19–64 years	≥65 years
None of the conditions listed below	No recommendation	PCV13* based on shared clinical decision making, PPSV23
Chronic medical conditions† (CMC)	PPSV23 only	
Cochlear implant, CSF leak	PCV13 + PPSV23	PCV13* + PPSV23
Immunocompromising conditions, functional or anatomic asplenia	PCV13 + PPSV23, repeat PPSV23 at least 5 years after last PPSV23	

*If not previously vaccinated
†Examples include alcoholism, chronic heart/liver/lung disease, diabetes, cigarette smoking
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How much pneumococcal disease burden is in adults ≥65 years?

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Estimated Burden of Invasive Pneumococcal Disease (IPD) Cases among U.S. Adults

	Population	All IPD	PCV13-type IPD	PCV15-type IPD	PCV20-type IPD	PPSV23-type IPD	IPD deaths
Estimated numbers for adults ≥19 years	250,680,255	29,876	8,609	12,627	17,651	20,924	3,481

Population estimated from the 2019 American Community Survey
IPD burden estimated from 2017–2018 ABCs data

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40–50% of all adult invasive pneumococcal disease burden is among adults ≥65 years

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% among adults ≥50 years	**47%**	**79%**	**77%**	**78%**	**77%**	**76%**	**87%**

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Approximately 80% of all adult invasive pneumococcal disease burden is among adults ≥50 years

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Estimated Burden of Hospitalized Pneumococcal Pneumonia Cases in U.S. Adults

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Estimated numbers for adults ≥19 years	250,680,255	29,613–70,152*	43,436–75,179*	60,458–125,278*	71,260–166,539*
% among ≥65 years	**22%**	**52–63%**	**53–74%**	**52–55%**	**49–50%**

≥50% of adult vaccine-type pneumococcal pneumonia cases are in adults ≥65 years

*Lower bound estimated by applying IPD serotype distribution from ABCs 2017–2018 to the number of estimated hospitalized pneumococcal pneumonia cases from CDC's Surveillance for Non-invasive Pneumococcal Pneumonia (SNiPP), 2017. Upper bound estimated by applying serotype distribution from Pfizer's Prospective, Multicenter Surveillance Study of Hospitalized CAP using Serotype-Specific Urinary Antigen Detection Assays (SSUAD), 2019 –2020, to all-cause pneumonia burden estimated from Ramirez et al. CID 2017

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% among ≥65 years	**22%**	**52–63%**	**53–74%**	**52–55%**	**49–50%**
% among ≥50 years	**47%**	**82–84%**	**79–84%**	**81–84%**	**82–83%**

≥ 80% of adult vaccine-type pneumococcal pneumonia cases are in adults ≥50 years

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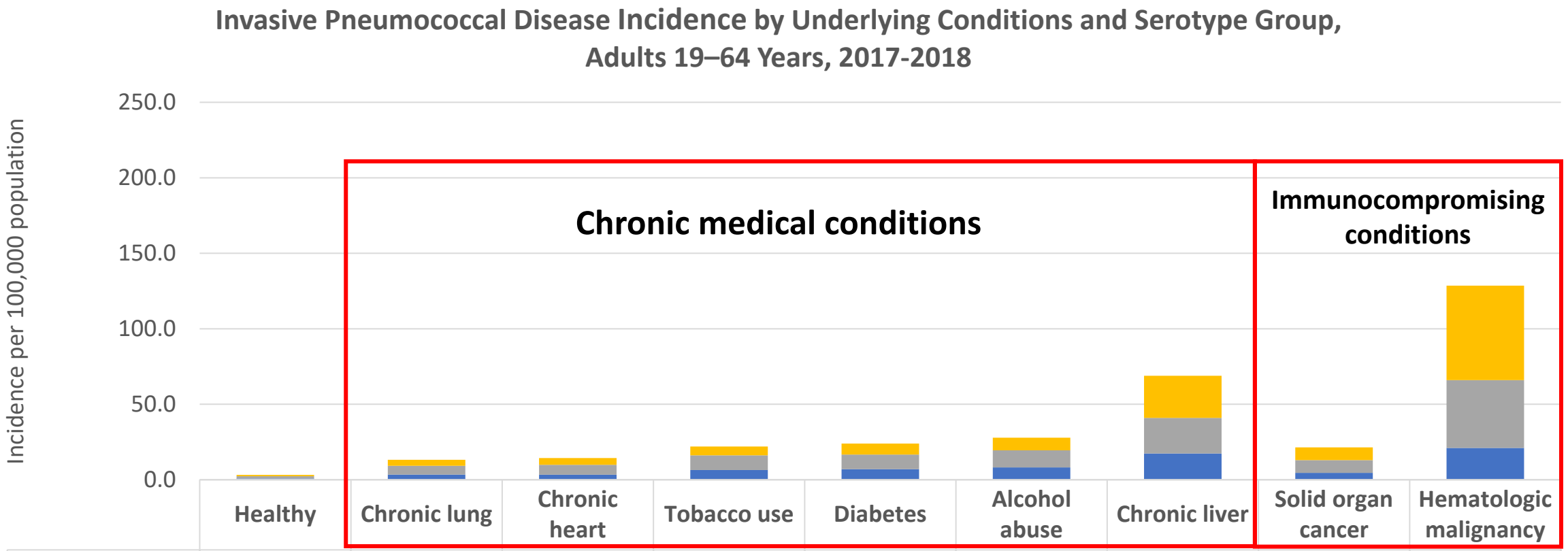
Invasive pneumococcal disease incidence among adults 19-64 years old with underlying conditions remains 4 to 40 times higher compared to adults without these conditions in the same age group.



	Healthy	Chronic lung	Chronic heart	Tobacco use	Diabetes	Alcohol abuse	Chronic liver	Solid organ cancer	Hematologic malignancy
Nonvaccine	0.8	4.0	4.4	5.8	7.3	8.3	27.9	8.4	62.5
PPSV23 unique	1.5	5.9	6.6	9.8	9.6	11.3	23.6	8.4	45.0
PCV13	0.8	3.4	3.3	6.4	7.0	8.2	17.4	4.6	21.1

ABCs and National Health Interview Survey (NHIS)

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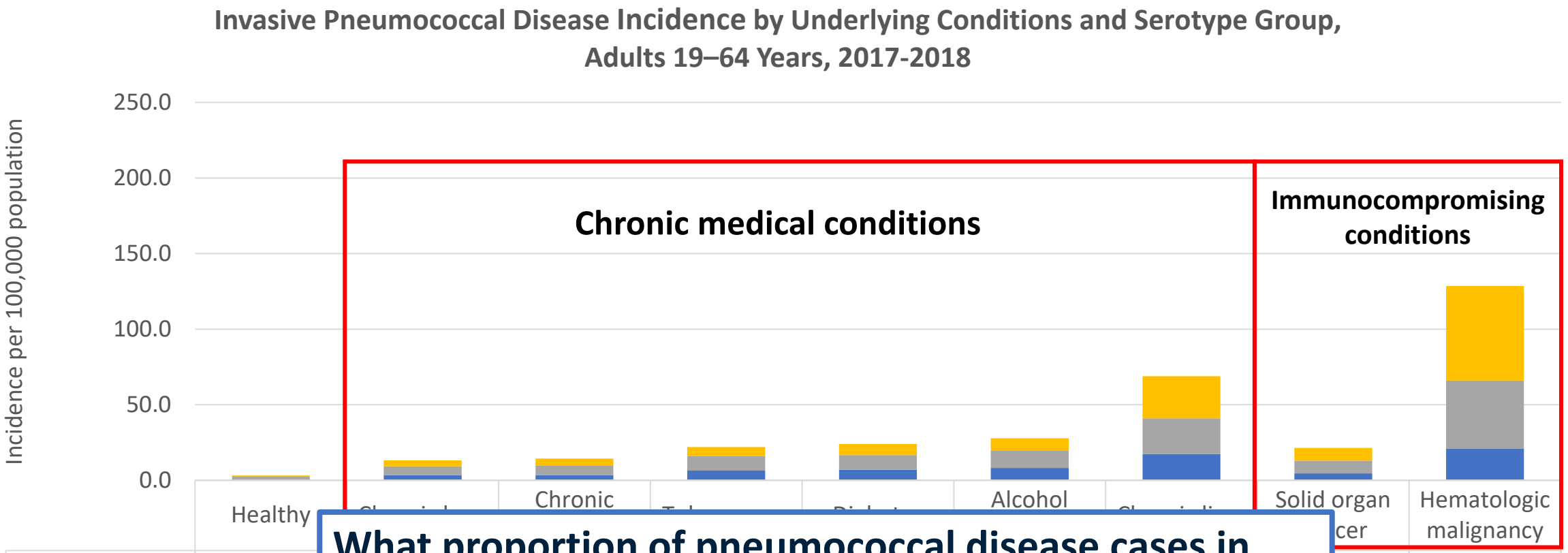
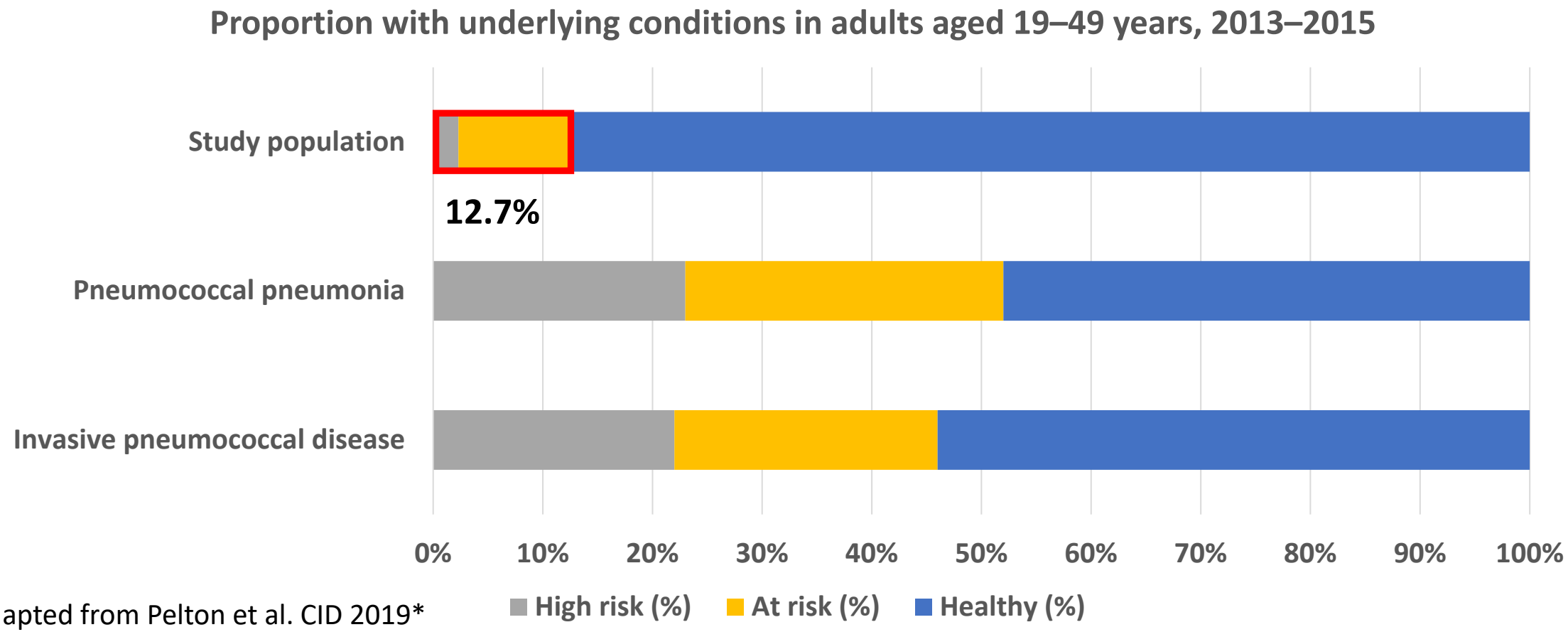


What proportion of pneumococcal disease cases in adults 19-64 years are among those with underlying conditions?

ABCs and National Health Interview Survey (NHIS)

12.7% of adults aged 19–49 years had underlying conditions.

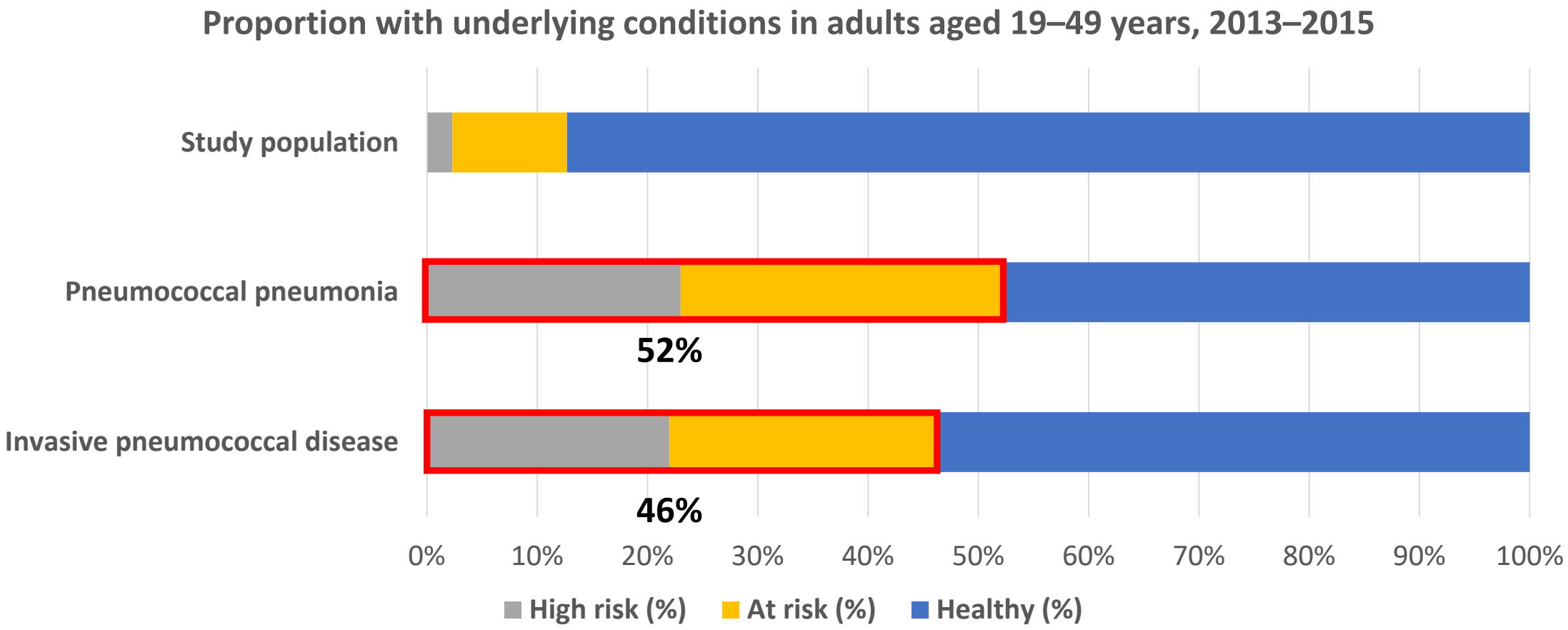


Adapted from Pelton et al. CID 2019*

At-risk: those who were immunocompetent with one or more chronic medical conditions.
High-risk: those who were immunocompromised or had a cochlear implant

*Pfizer funded study

In adults aged 19–49 years, 52% of pneumococcal pneumonia cases and 46% of invasive pneumococcal disease cases were in adults with underlying conditions.



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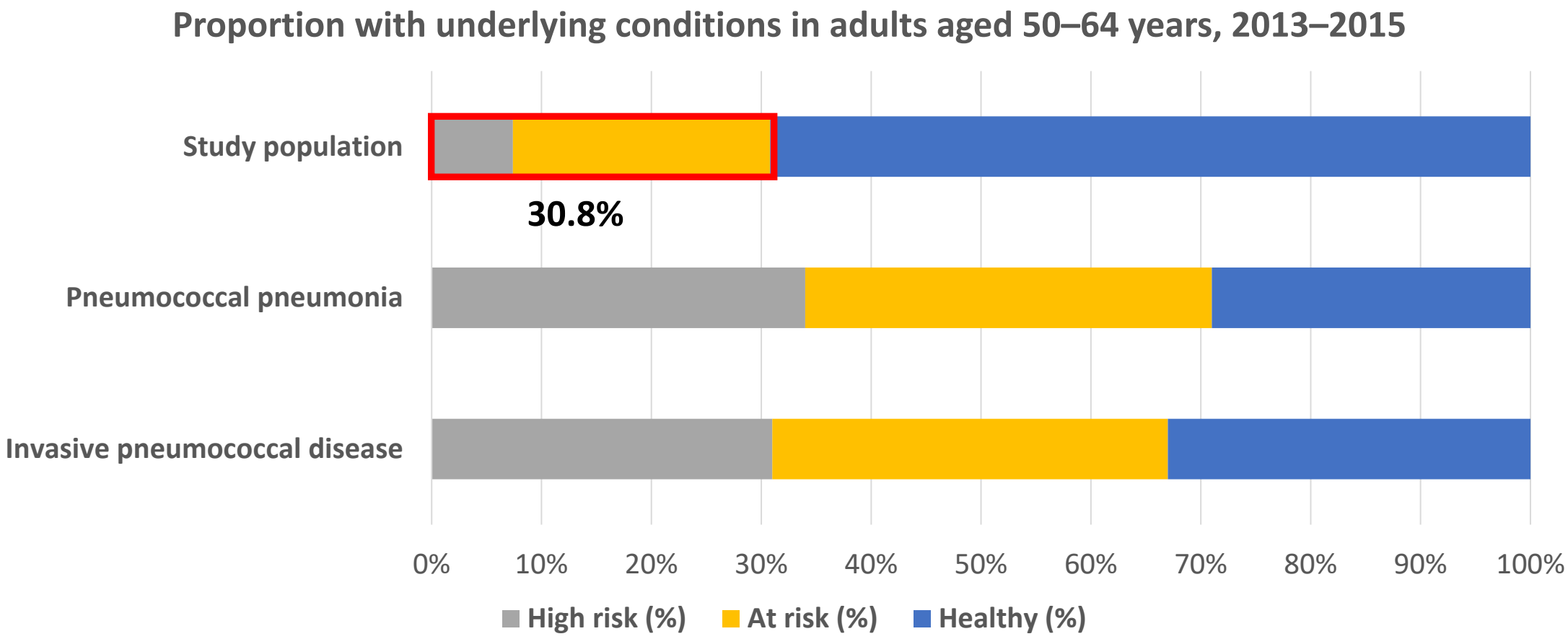
31% of adults aged 50–64 years had underlying conditions.



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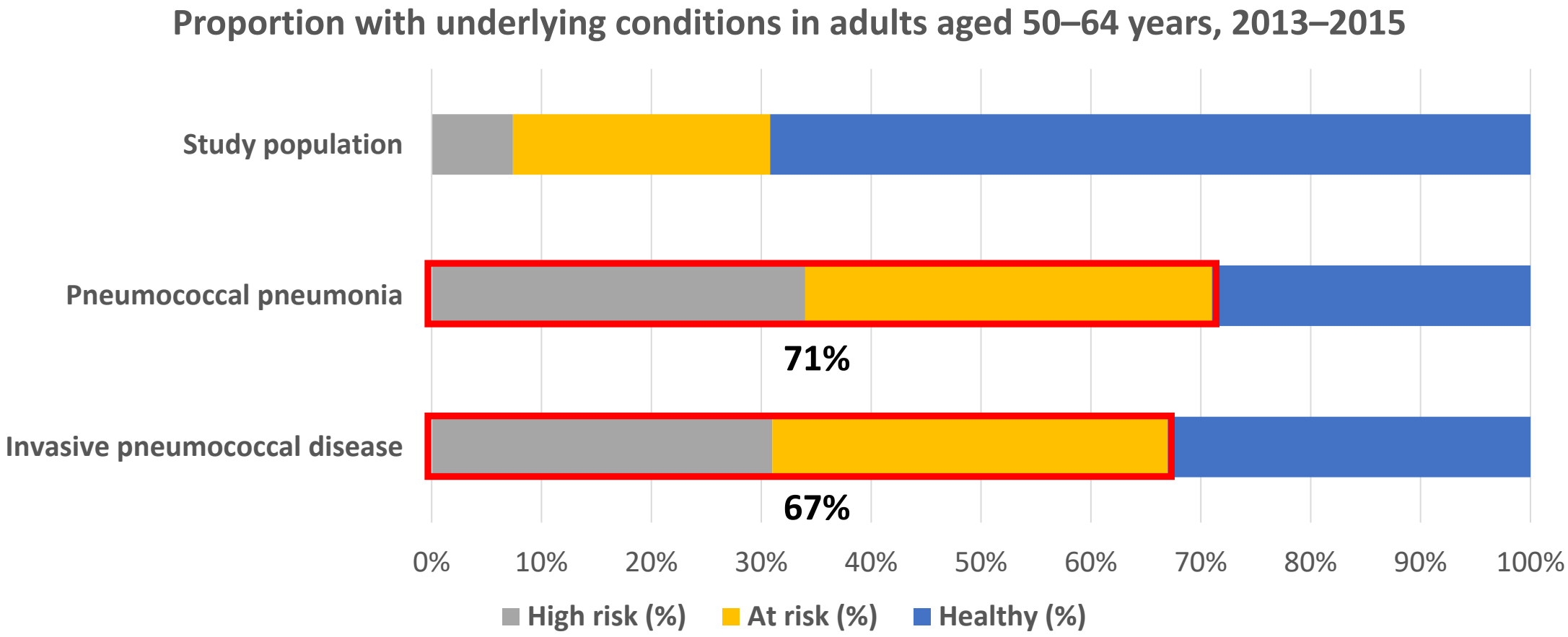
In adults aged 50–64 years, 71% of pneumococcal pneumonia cases and 67% of invasive pneumococcal disease cases were in adults with underlying conditions.



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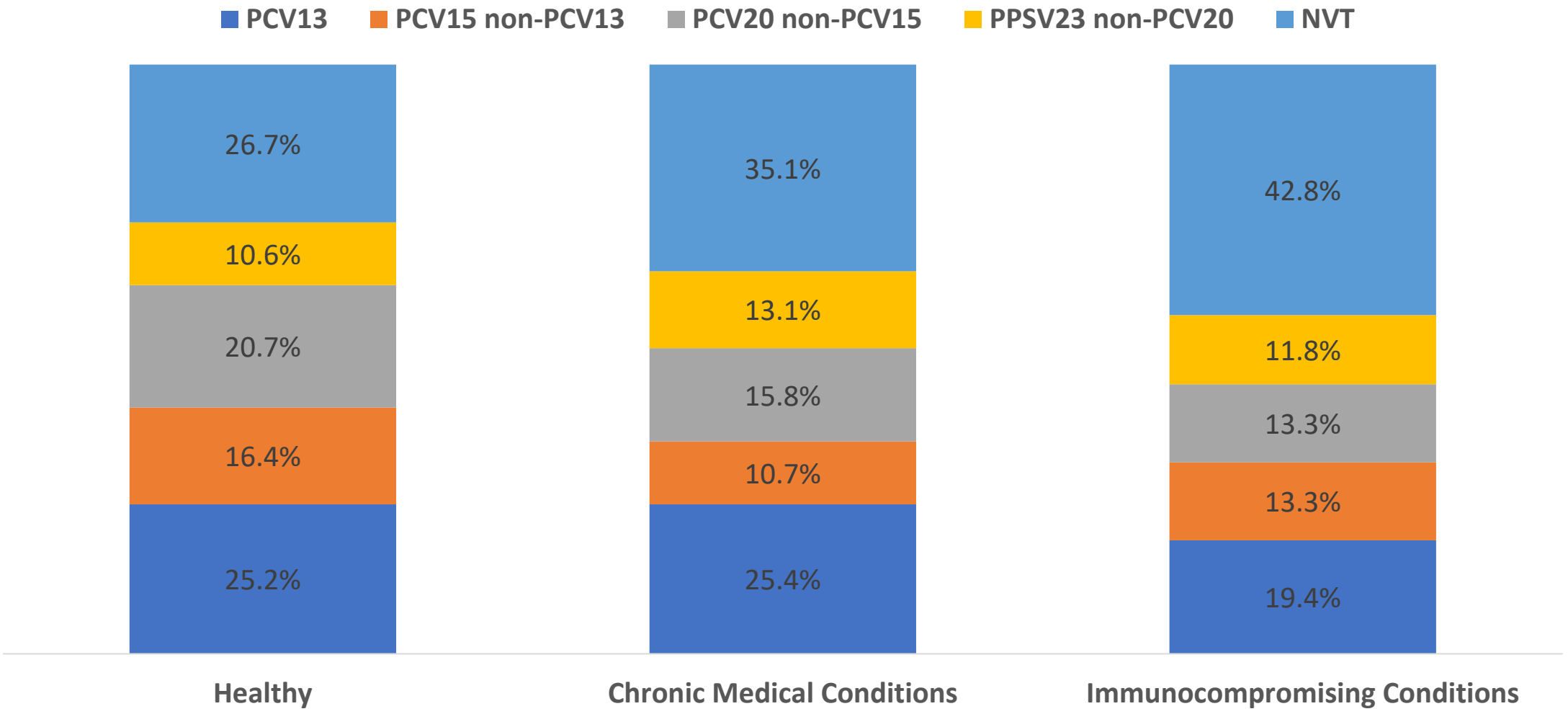
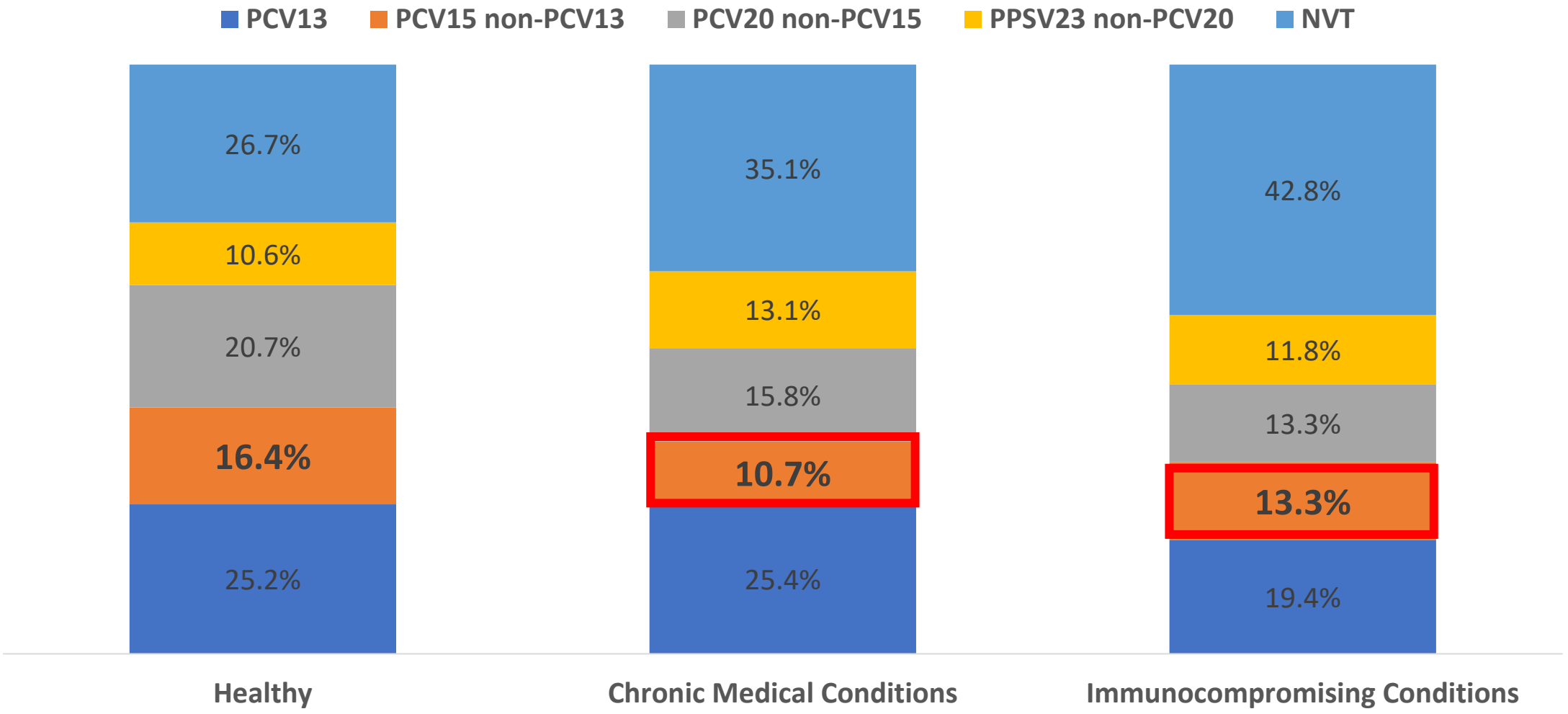
What proportion of invasive pneumococcal disease in adults aged 19–64 years with underlying conditions is caused by PCV15 or PCV20 serotypes?



ABCs and NHIS, 2017–2018

The proportion of invasive pneumococcal disease due to additional serotypes included in PCV15 or PCV20 was relatively smaller in adults with underlying conditions compared to adults without conditions.



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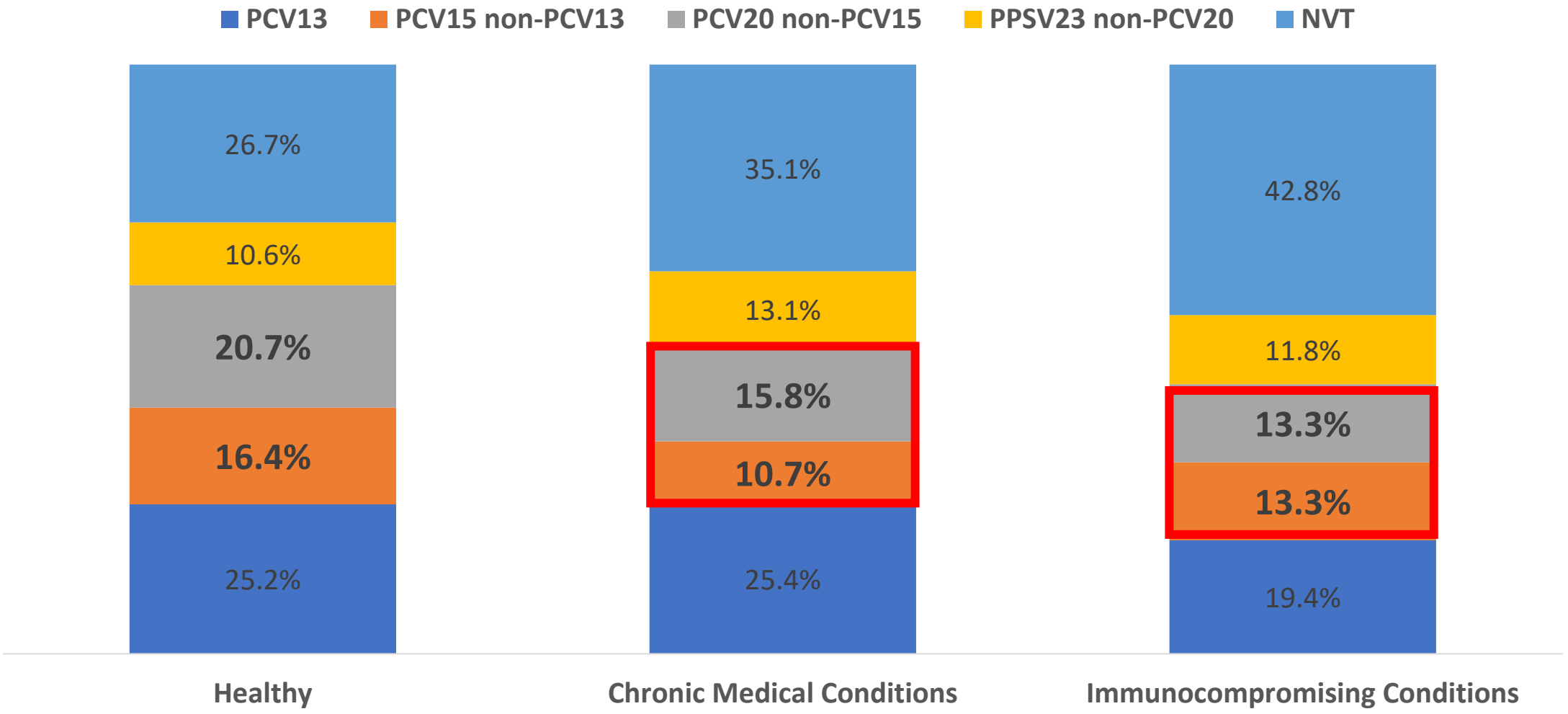
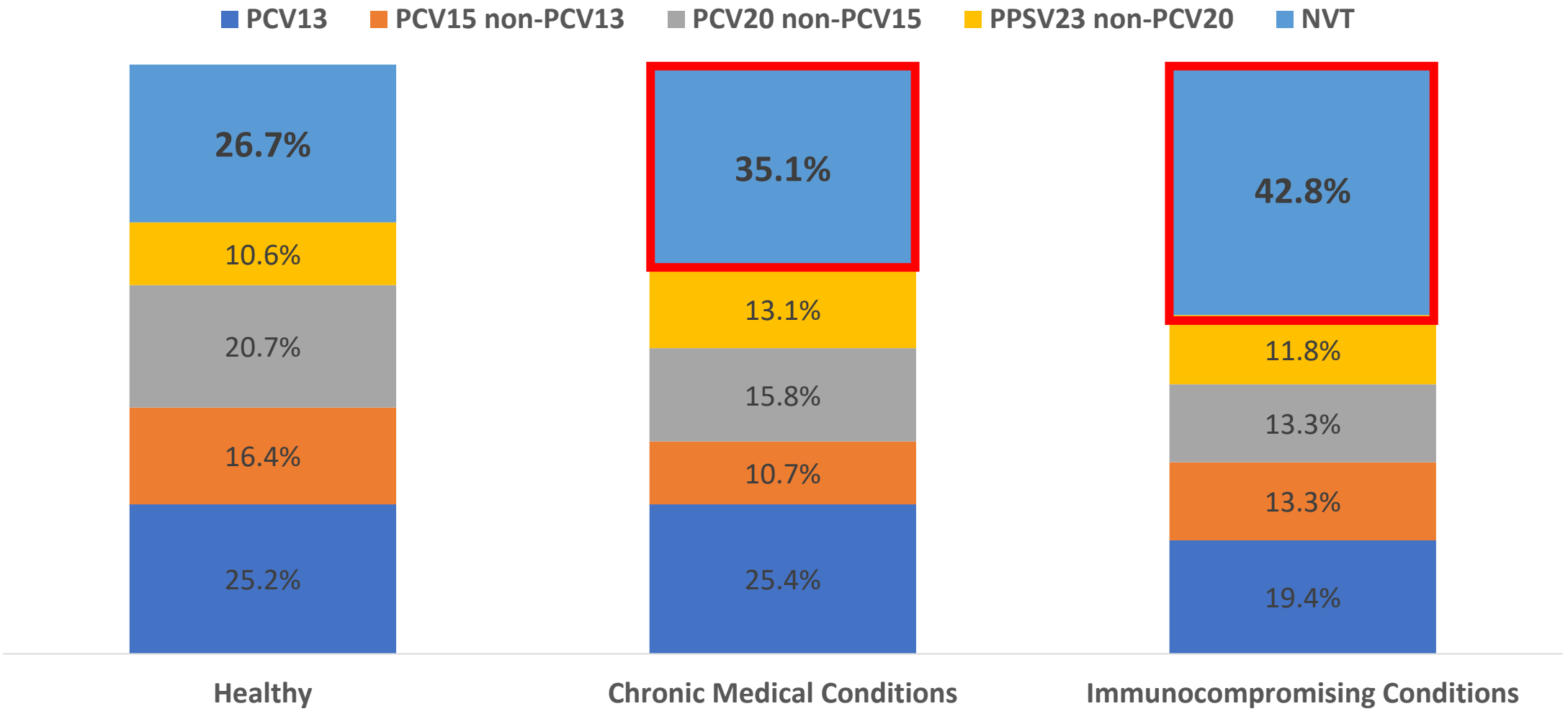


ABCs and NHIS, 2017–2018

The proportion of invasive pneumococcal disease due to non-vaccine types was relatively larger in adults aged 19–64 years with underlying conditions compared to adults without conditions.



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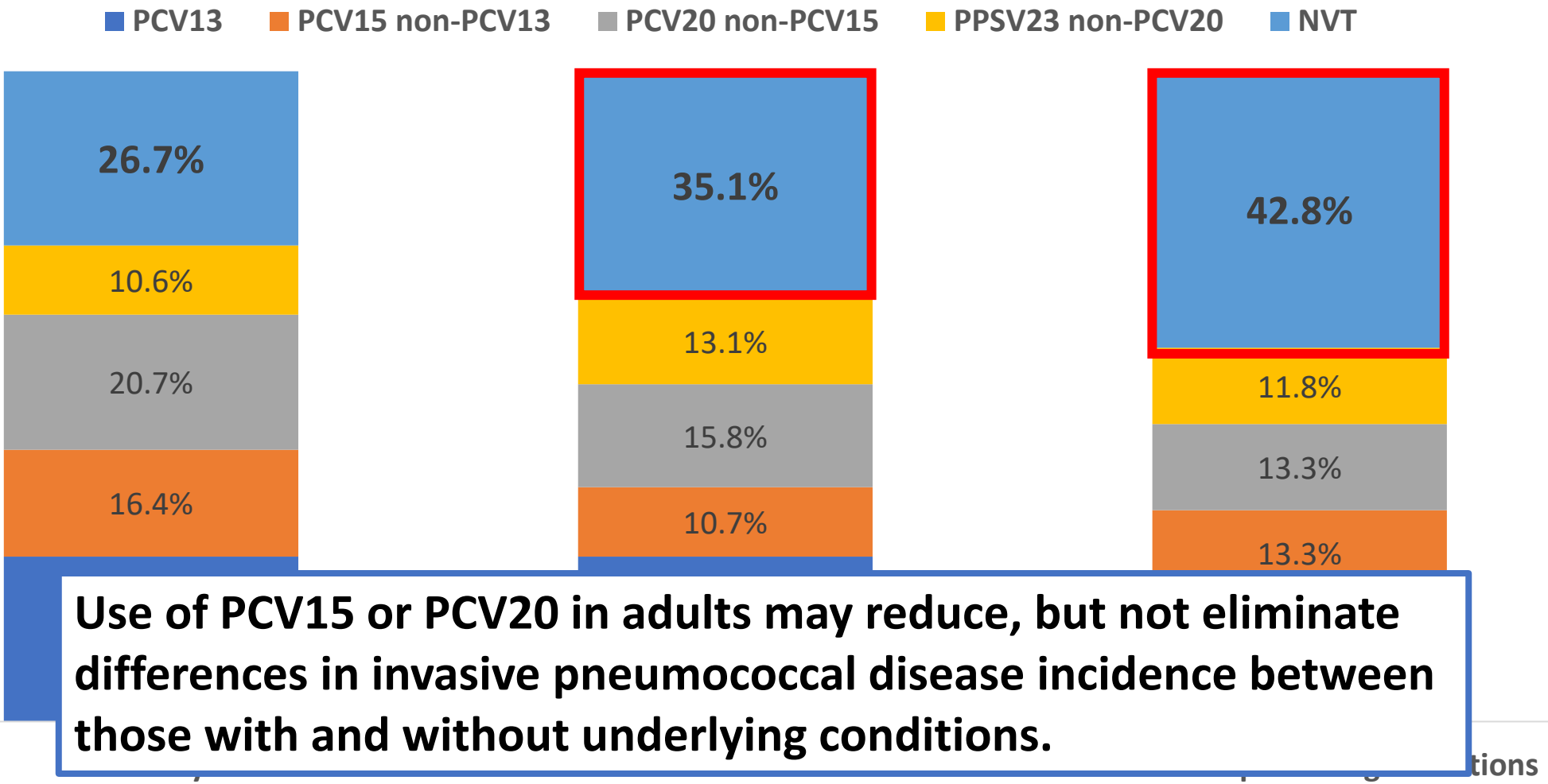
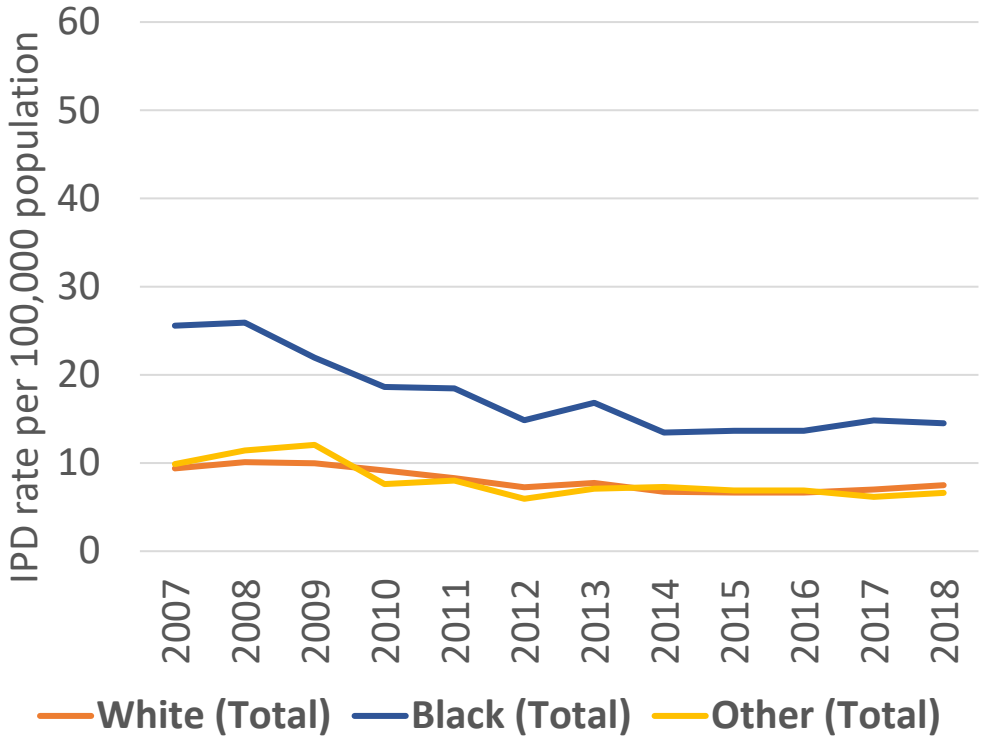


Use of PCV15 or PCV20 in adults may reduce, but not eliminate differences in invasive pneumococcal disease incidence between those with and without underlying conditions.

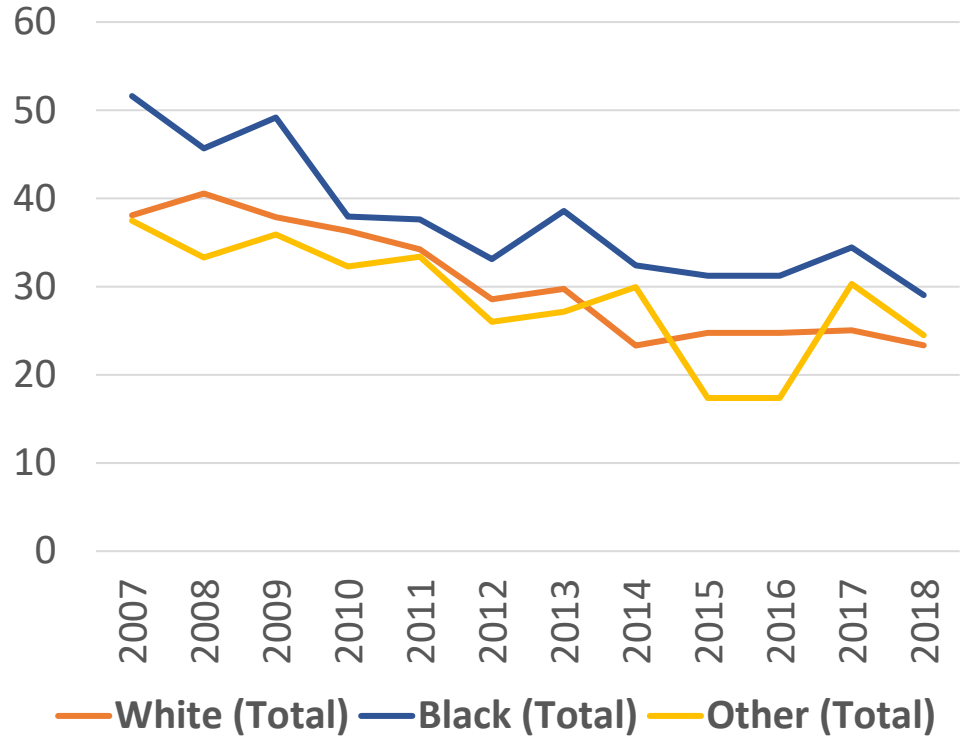
ABCs and NHIS, 2017–2018

All invasive pneumococcal disease rates has been higher in the Black population compared to other racial groups.

All IPD Rates by Race, Adults Aged 19–64 years



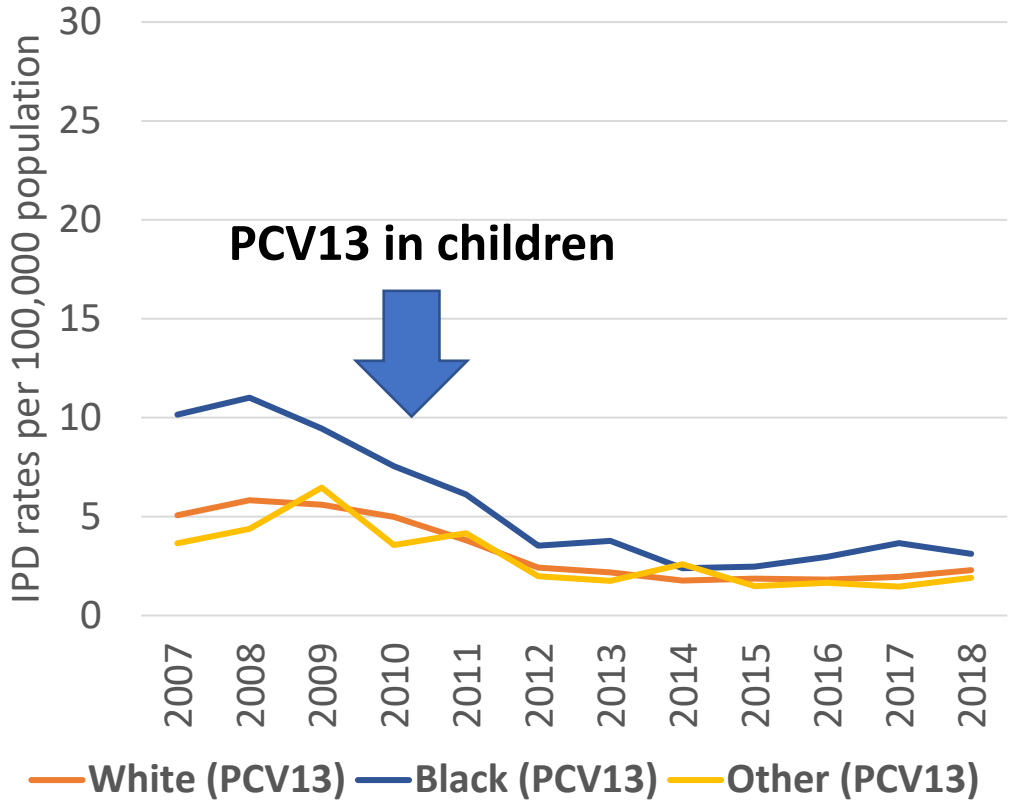
All IPD Rates by Race, Adults Aged ≥65 years



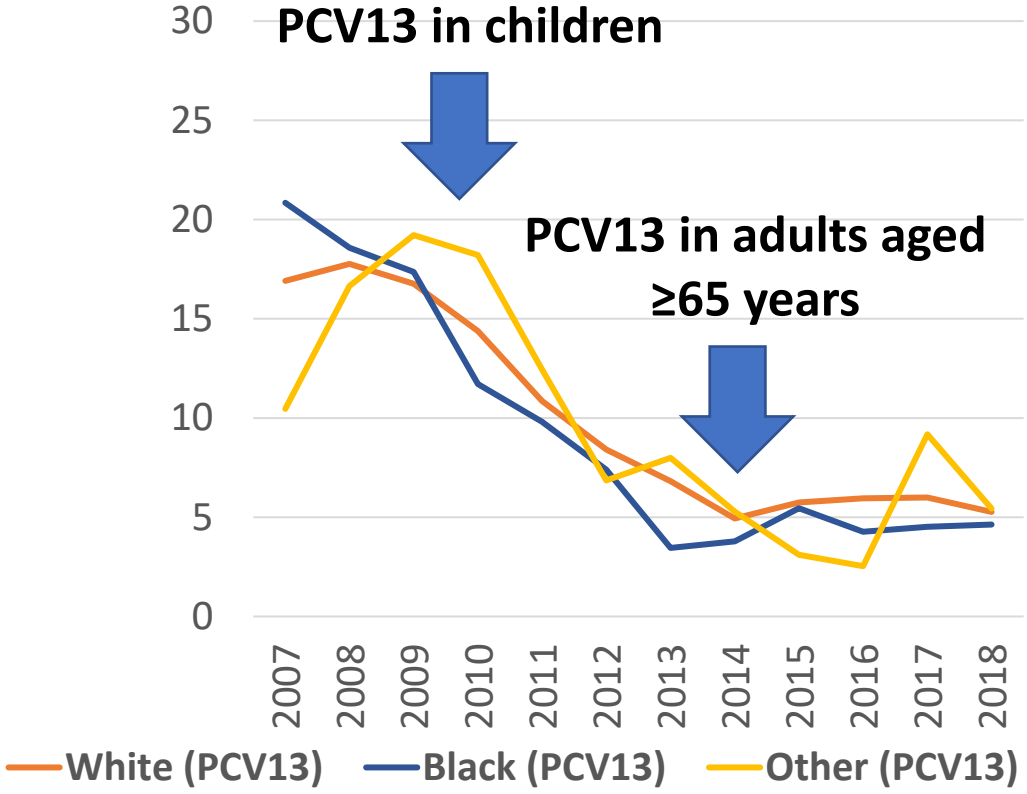
ABCs 2007–2018

Racial disparities in PCV13-type invasive pneumococcal disease have been reduced after PCV13 introduction.

PCV13-type IPD Rates by Race, Adults Aged 19–64 years



PCV13-type IPD Rates by Race, Adults Aged ≥65 years



ABCs 2007–2018

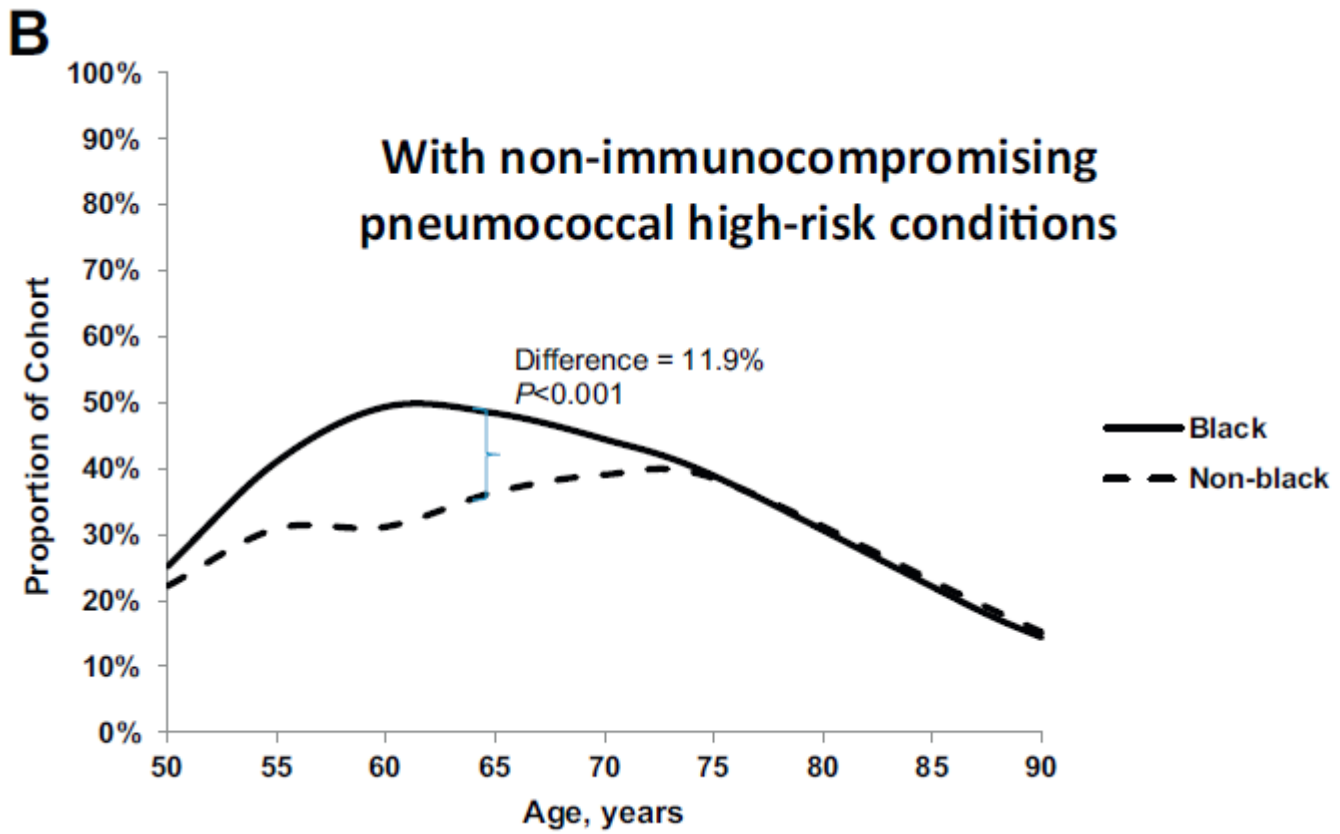
Among adults ≥50 years hospitalized with pneumococcal disease, the Black population was more likely to be younger than the non-Black population.

Table 1. Demographic characteristics of patients hospitalized with pneumococcal disease – NIS 2014*.

Characteristic	Total (N = 2,193,296)	Black (N = 236,620)	Non-Black (N = 1,956,676)	*P* Value
Age group (years)				<0.001
50-64	28.9%	45.0%	26.9%	
65-79	38.7%	35.9%	39.0%	
80+	32.4%	19.1%	34.0%	
Sex				<0.001
Female	50.7%	52.9%	50.4%	
Male	49.3%	47.1%	49.6%	
Medical insurance				0.449
Private/other	14.0%	14.2%	14.0%	
Public/self-pay	86.0%	85.8%	86.0%	
Discharged status				0.653
Alive	92.0%	91.9%	92.0%	
Dead	8.0%	8.1%	8.0%	
Length of stay (days), mean (SE)	7.7 (0.05)	9.1 (0.10)	7.5 (0.05)	<0.001
Cost, $US, mean (SE)	18,154 (203)	20,733 (306)	17,844 (203)	<0.001

**NIS=National Inpatient Sample 2014.*

Nowalk et al. Journal of the National Medical Association 2019.



The proportion of adults with underlying conditions was higher in the Black population compared to the non-Black population

Non-immunocompromising pneumococcal high-risk conditions: chronic heart, lung, or liver disease; diabetes mellitus; alcoholism; asthma; cirrhosis

Nowalk et al. Journal of the National Medical Association 2019.

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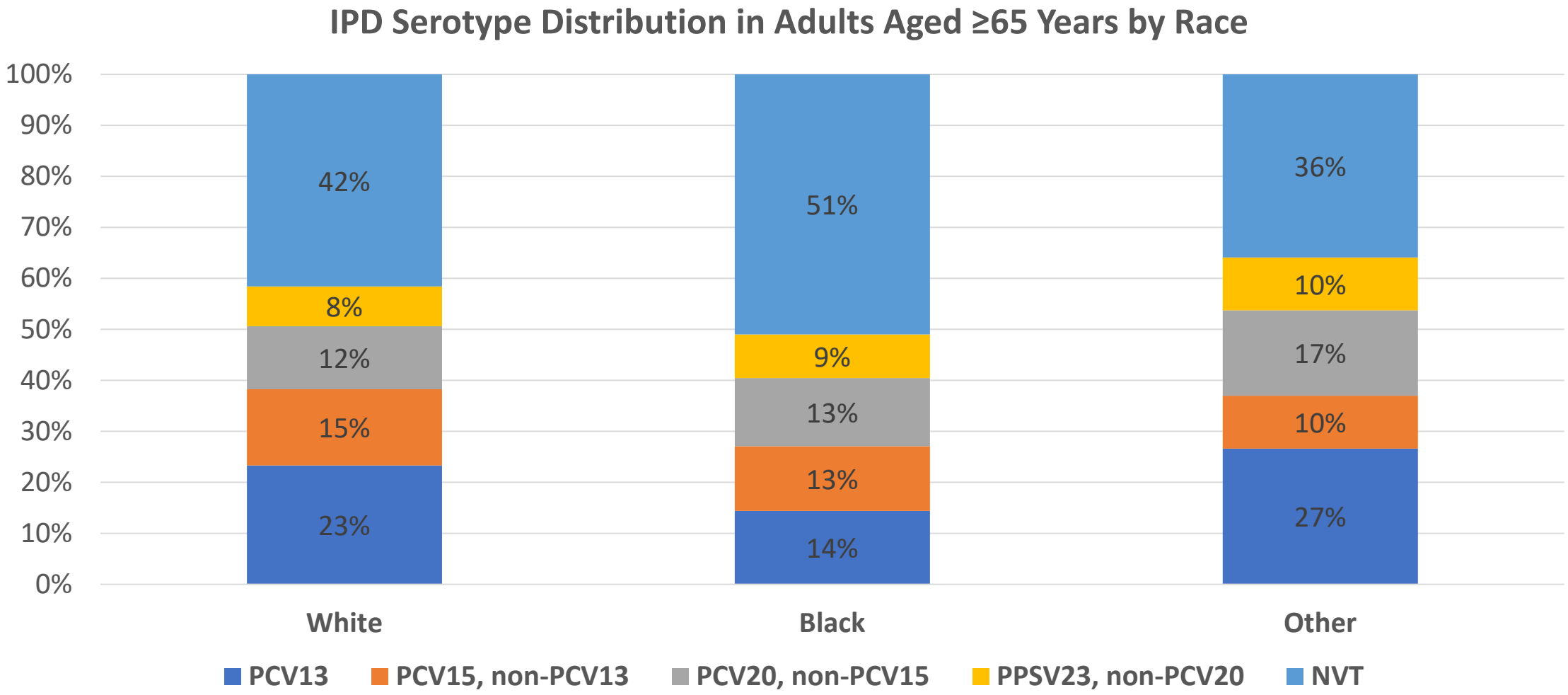
- Simplifying existing pneumococcal vaccine recommendations could help improve vaccine coverage among adults
- **Disparities in pneumococcal disease burden and vaccine coverage should be reduced**
- Timely recommendations for each new vaccine should be made after FDA licensure

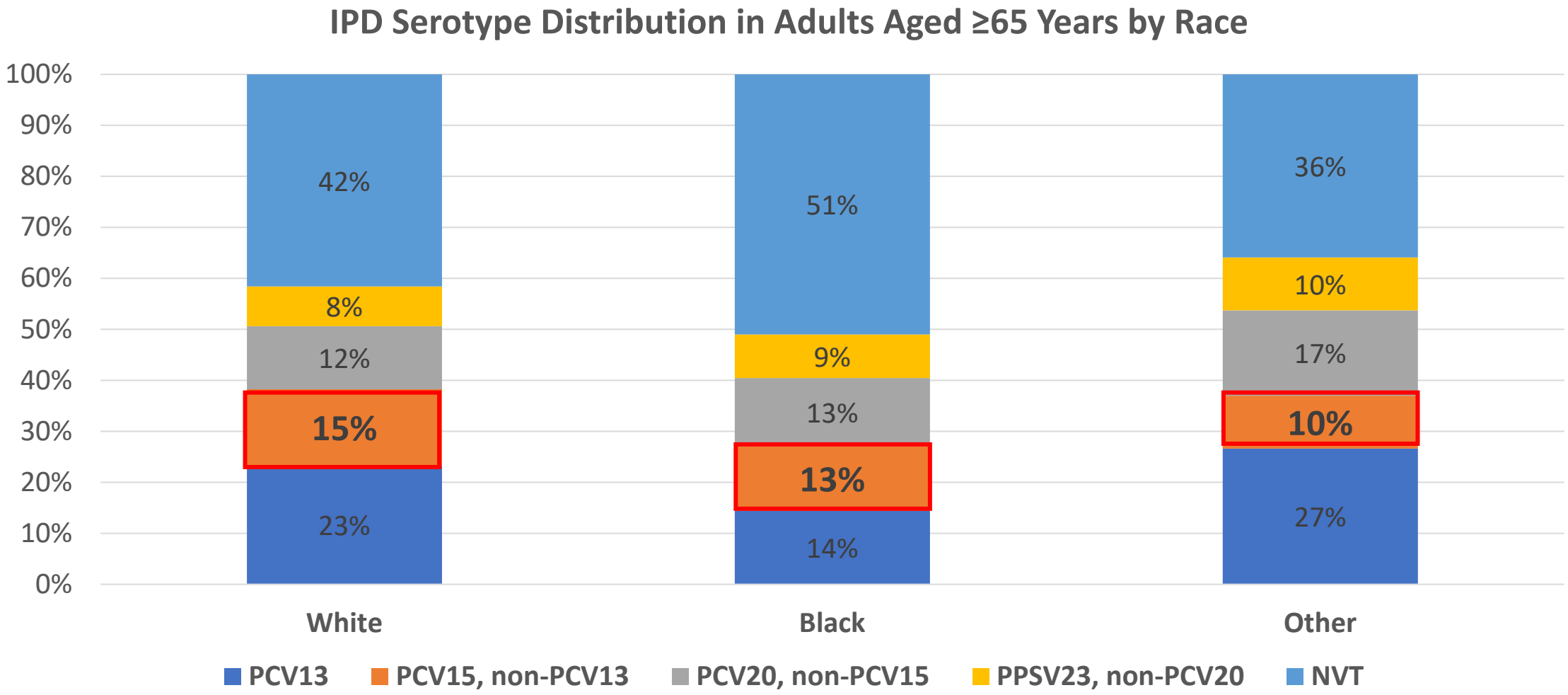
Would use of PCV15 or PCV20 in adults reduce racial disparities in pneumococcal disease burden?

Could use of PCV15 or PCV20 in adults further reduce racial disparities in pneumococcal disease burden?



ABCs 2017–2018

Do we expect that use of PCV15 or PCV20 in adults will further reduce racial disparities in pneumococcal disease burden?



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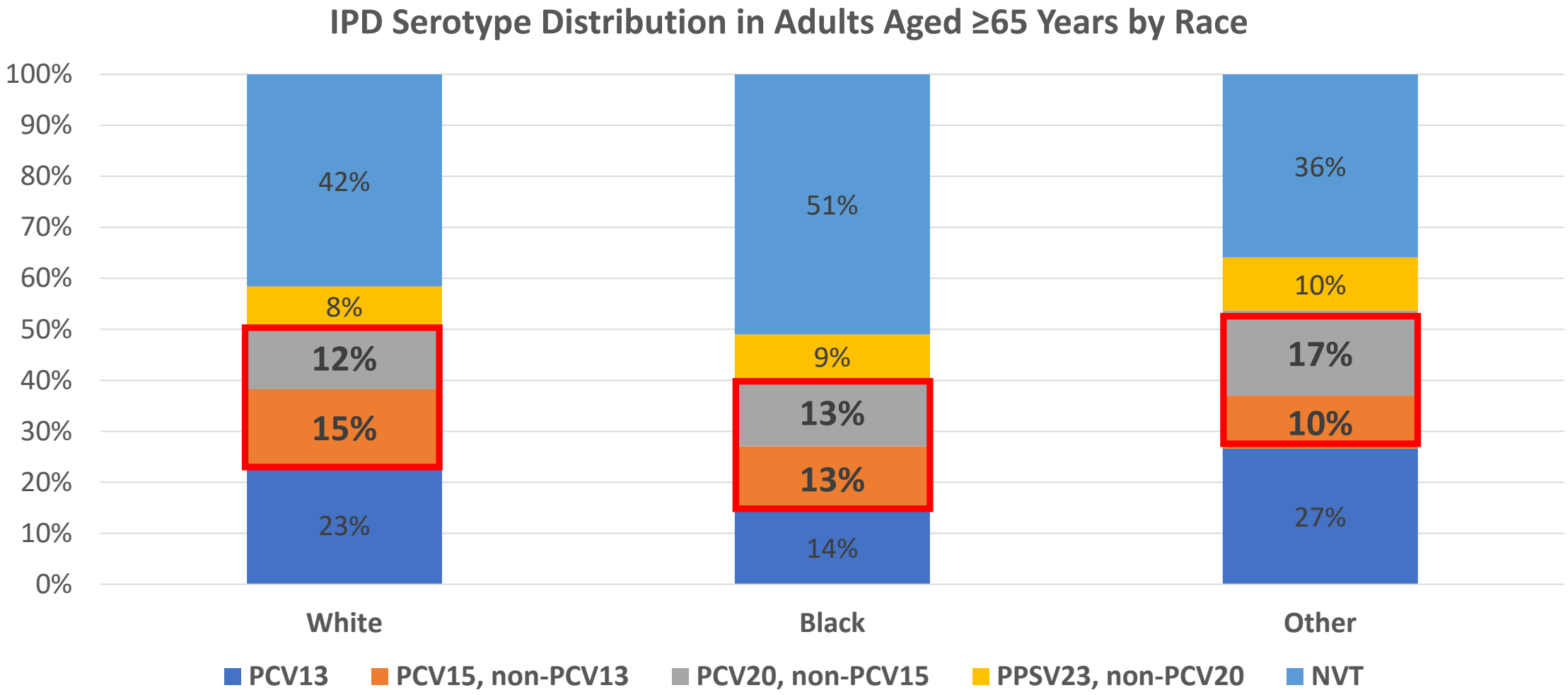

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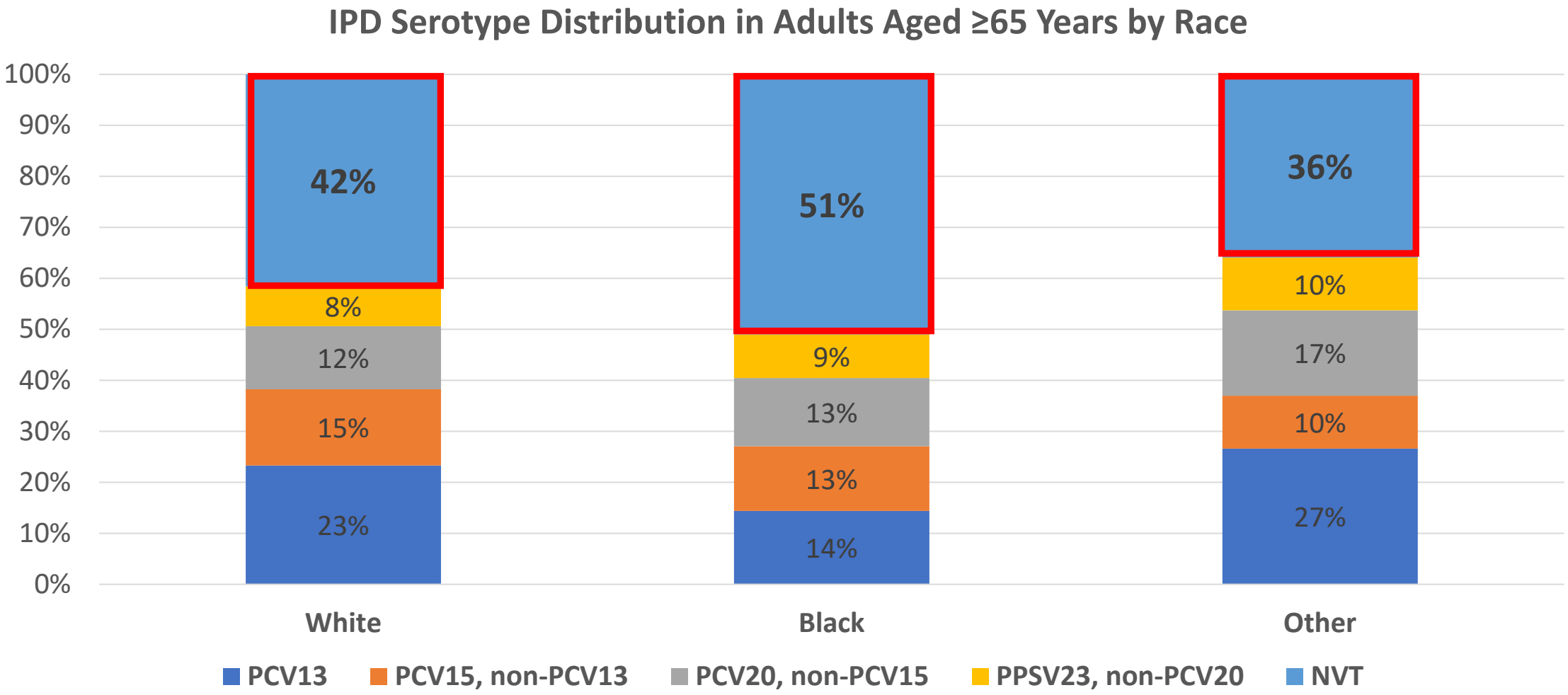
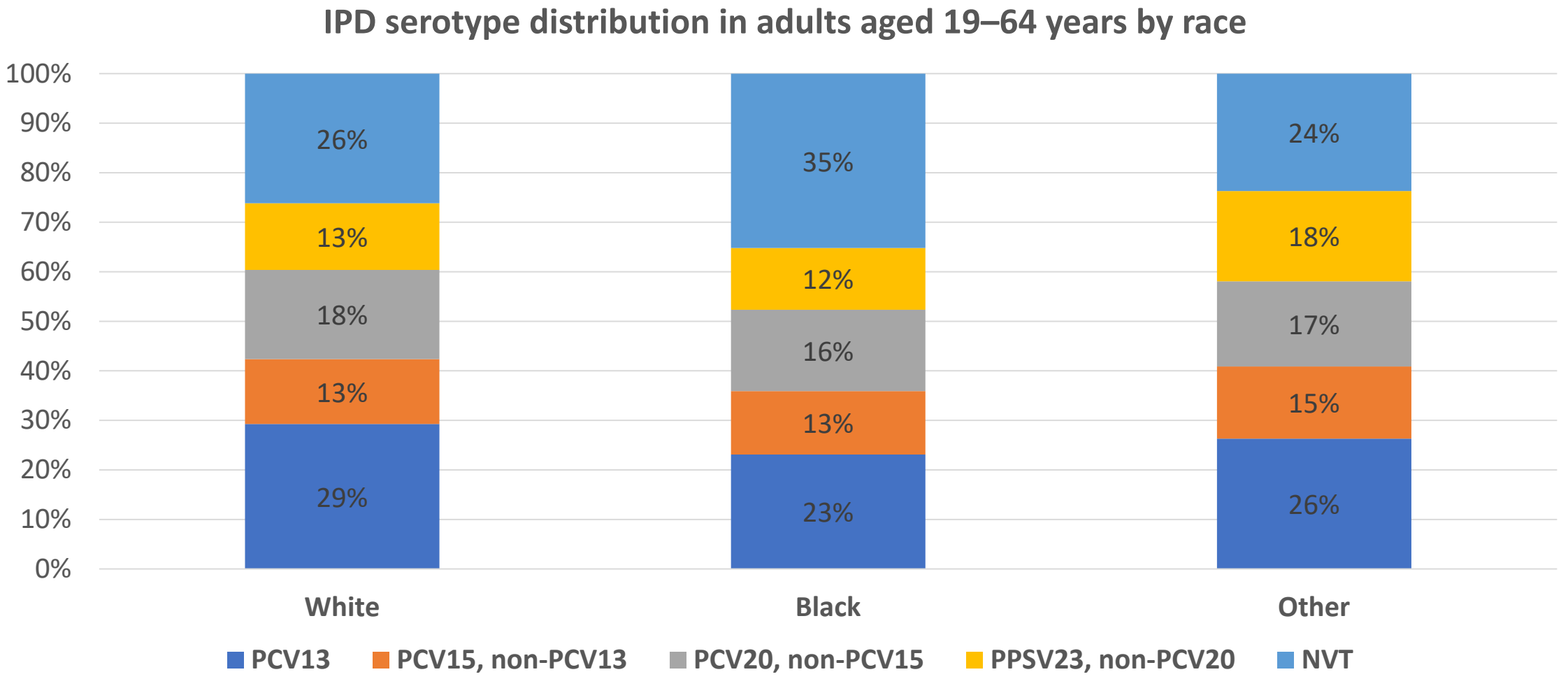


ABCs 2017–2018

Similar trends were observed in adults aged 19–64 years.



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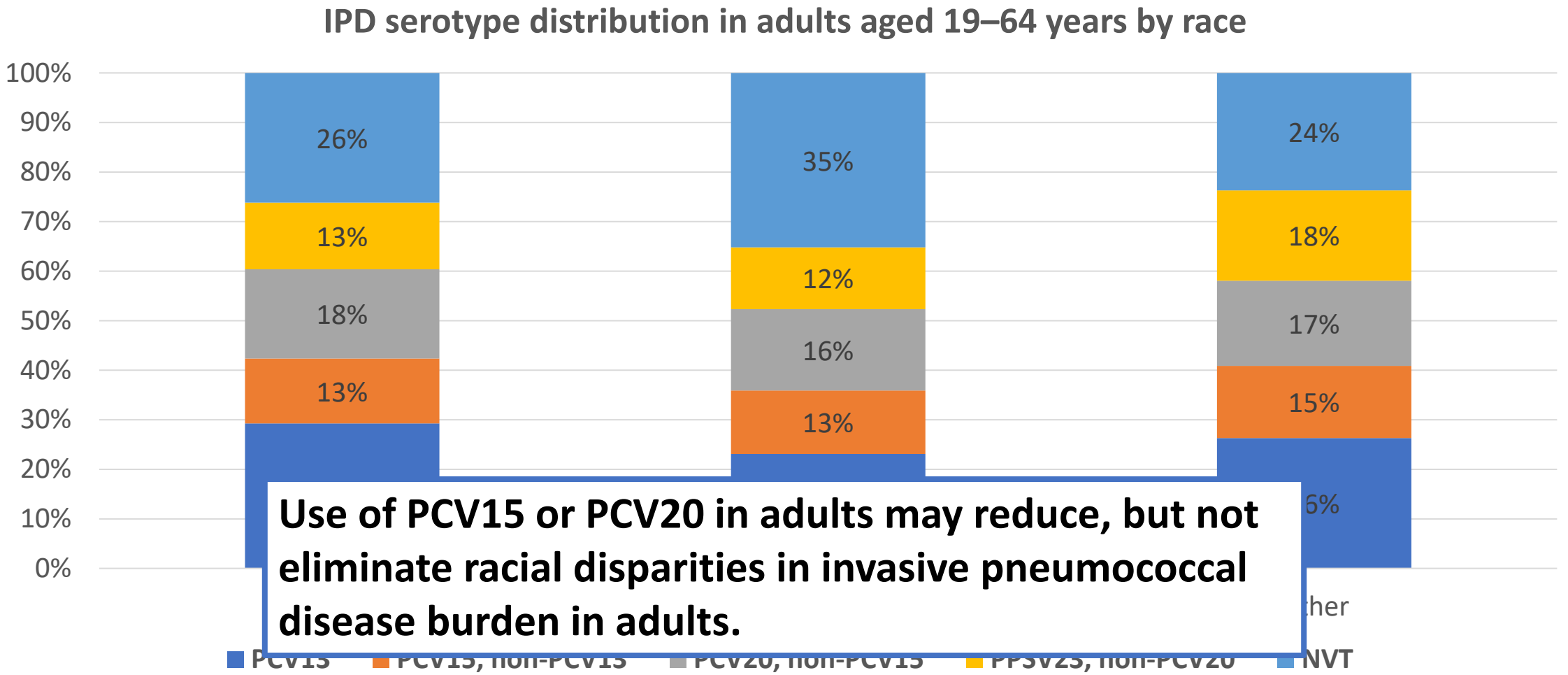


Use of PCV15 or PCV20 in adults may reduce, but not eliminate racial disparities in invasive pneumococcal disease burden in adults.

ABCs 2017–2018

Overarching Policy Questions Under Consideration by the Work Group

- Should PCV15 or PCV20 be routinely recommended in older adults aged ≥50 or ≥65 years?
- Should PCV15 or PCV20 be recommended in younger adults with underlying medical conditions?
- Should we consider the use of PCV15 or PCV20 alone or in series with PPSV23?

Policy Options for Cost-Effectiveness Analysis

Option 1. PCV for all adults **aged ≥65 years**	+	PCV for adults **aged 19–64 years** with underlying conditions
Option 2. PCV for all adults **aged ≥50 years**	+	PCV for adults **aged 19–49 years** with underlying conditions

Policy Options for Cost-Effectiveness Analysis

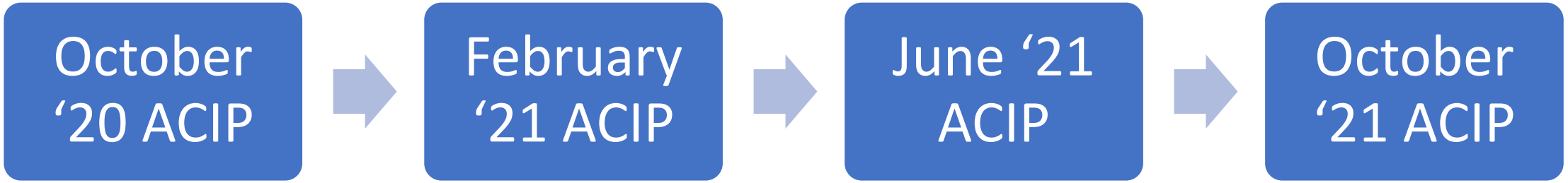
For each option, the following strategies will be considered, compared to the current pneumococcal vaccine recommendations.

	Risk-based recommendation	**Age-based recommendation**
Strategy a	PCV15	PCV15
Strategy b	PCV20	PCV20
Strategy c	PCV15+PPSV23	PCV15+PPSV23
Strategy d	PCV20+PPSV23	PCV20+PPSV23

Evidence to be Reviewed by the Work Group

- Immunogenicity and safety for new PCVs (Phase 3 studies)
- Epidemiology of pneumococcal disease and vaccine-preventable disease burden for:
  - Invasive pneumococcal disease
  - Non-invasive pneumococcal pneumonia
  - Mortality
- Expected public health impact and cost-effectiveness of PCV15 or PCV20
- Review new evidence on the effectiveness of PPSV23
- GRADE and EtR

Proposed Timeline of ACIP Presentations



Presentation on:

- Epidemiology of current U.S. pneumococcal disease
- New vaccine products and summary of phase 3 study results
- Policy question(s) proposed by the WG

Presentation on:

- **Cost-effectiveness analysis and public health impact**
- **EtR/GRADE**

Vote (if product licensed)

Acknowledgements

- ACIP and the Pneumococcal Work Group
- CDC contributors and consultants: Jessica Randall, Hilda Razzaghi, Walter Williams, Jessica MacNeil, Penina Haber, Pedro Moro, Sarah Schillie, Rachel Gorwitz, Allen Craig, Tamara Pilishvili, Ryan Gierke, Jennifer Loo Farrar, Wei Xing, Doug Outcalt-Campos, Rebecca Morgan

Thank you!

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov