SUPREME COURT OF THE STATE OF NEW YORK APPELLATE DIVISION: THIRD DEPARTMENT

F.F. on behalf of her minor children, Y.F., E.F. Y.F.; M. & T. M. on behalf of their minor children, C.M. and B.M.; E.W., on behalf of his minor son, D.W.; Rabbi M., Case No. 530783 on behalf of his minor children I.F.M, M.M & C.M.; M.H. on behalf of W.G.; C.O., on behalf of her minor children, C.O., M.O., Z.O. and Y.O; Y. & M. on behalf of their minor children M.G., P.G., M.G., S.G., F.G. and C.G.; J.M. on behalf of his minor children C.D.M. & M.Y.M.; J.E., on behalf of his minor children, P.E., M.E., S.E., D.E., F.E. and E.E.; C.B. & D.B., on behalf of their minor children, M.M.B. and R.A.B.; T.F., on behalf of her minor children, E.F., H.F. and D.F.; L.C., on behalf of her minor child, M.C.; R.K., on behalf of her minor child, M.K.; R.S. & D.S., on behalf of their minor children, E.S. and S.S.; J.M. on behalf of her minor children, S.M. & A.M.; F.H., on behalf of her minor children, A.H., H.H. and A.H.; M.E. on behalf of his minor children, M.E. & P.E.; F.F. on behalf of her minor children, D.B., on behalf of her minor children, W.B., L.B. & L.B.; R.B., on behalf of her minor child, J.B.; L.R., on behalf of her minor child, E.R.: G.F., on behalf of his minor children, C.F. & A.F.; D.A., on behalf of her minor children, A.A. & A.A.; T.R., on behalf of her minor children, S.R. and F.M.; B.N., on behalf of her minor children, A.N., J.N. & M.N.; M.K. on behalf of her minor child, A.K.; L.B., on behalf of her minor children, B.B., A.B. & S.B.; A.V.M., on behalf of her minor children, B.M. and G.M.; N.L., on behalf of her minor children, H.L. & G.L.; L.G., on behalf of her minor children, M.C. and C.C.; L.L., on behalf of her minor child, B.L.; C.A., on behalf of her minor children, A.A., Y.M.A., Y.A. and M.A.; K.W., on behalf of her minor child, K.W.; B.K., on behalf of her minor children, N.K., S.K., R.K. and L.K.; W.E. and C.E., on behalf of their minor child, A.E.; R.J. & A.J., on behalf of their minor child, A.J.; S.Y. & Y.B., on behalf of their minor

children, I.B. and J.B.; T.H., on behalf of her minor child, J.H.; K.T., on behalf of her minor children, A.J.T. & A.J.T.; L.M., on behalf of her minor child, M.M., D.Y.B., on behalf of her minor child, S.B.; A.M., on behalf of her minor child, G.M.; F.M., on behalf of his three minor children, A.M.M., D.M.M. and K.M.M.; H.M., on behalf of her minor child, R.M.; M.T. & R.T., on behalf of their minor child, R.T.; E.H., on behalf of her minor children M.M.S.N. and L.Y.N., Rabbi M.B. on behalf of his minor child, S.B. and S.L. & J.F. on behalf of their minor child C.L., A-M.P., on behalf of her minor child, M.P.; R.L, on behalf of her minor children G.L, A.L and M.L.; N.B., on behalf of her minor child M.A.L.; B.C., on behalf of her minor child, E.H. and J.S. & W.C. on behalf of their minor children M.C. and N.C., S.L., on behalf of his three minor children, A.L., A.L. and A.L., L.M., on behalf of her two minor children, M.M. and M.M., N.H., on behalf of his three minor children, J.H., S.H. and A.H., on their own behalves and on behalf of thousands of similarly-situated parents and children in the State of New York,

Plaintiffs-Appellants,

-against-

State of New York; Andrew Cuomo, Governor; Letitia James, Attorney General

Defendants-Respondents.

BRIEF OF THE AMERICAN MEDICAL ASSOCIATION, THE MEDICAL SOCIETY OF NEW YORK, AND NEW YORK STATE AMERICAN ACADEMY OF PEDIATRICS AS *AMICI CURIAE* IN SUPPORT OF DEFENDANTS-RESPONDENTS

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Concepts of Herd Protection and Immunity, 2 Procedia in Vaccinology 134 (2010)
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STATEMENTS OF INTEREST

The American Medical Association (AMA) is the largest professional association of physicians, residents, and medical students in the United States. Through state and specialty medical societies and other physician groups seated in its House of Delegates, substantially all United States physicians, residents and medical students are represented in the AMA's policymaking process. The AMA was founded in 1847 to promote the science and art of medicine and the betterment of public health, and these remain its core purposes. AMA members practice in every state, including New York, and in every medical specialty. The AMA believes that nonmedical exemptions from immunizations endanger the health of the unvaccinated individual and the health of those in his or her group and the community at large.

The Medical Society of the State of New York (MSSNY) is an organization of approximately 30,000 licensed physicians, medical residents, and medical students in New York State. Members participate in both the state society and in their local county medical societies. MSSNY is a non-profit organization committed to representing the medical profession as a whole and advocating health related rights, responsibilities and issues. MSSNY strives to promote and maintain high standards in medical education and in the practice of medicine in an effort to ensure that quality medical care is available to the public. As MSSNY explained in a memo to legislators that was joined by more than two dozen organizations, asserting religious exceptions to vaccinations impacts not only those asserting the exception, but also those who interact with them who may not have received the vaccination due to medical reasons or who are too young to even be immunized.

The AMA and MSSNY appear on their own behalves and as representatives of the AMA Litigation Center. The Litigation Center is a coalition among the AMA and the medical societies of every state. The AMA Litigation Center is the voice of America's medical profession in legal proceedings across the country. The mission of the Litigation Center is to represent the interests of the medical profession in the courts. It brings lawsuits, files amicus briefs, and otherwise provides support or becomes actively involved in litigation of general importance to physicians. Together, the amici represent hundreds of thousands of doctors in New York and across the nation.

The New York State American Academy of Pediatrics is a coalition of three independent, regional pediatric chapters representing over 4,000 pediatricians and child-health providers across New York State. The coalition is dedicated to advancing evidenced-based policies that benefit the physical, mental and emotional health of the 4.6 million children in New York State. These include policies that increase and maintain high immunization rates in our communities. As part of its activities, the coalition routinely works with school boards, county governments, and New York City and State's elected officials to promote scientifically based policies that protect children from vaccine-preventable disease.

INTRODUCTION

When the New York State Legislature passed a bill eliminating religious exemptions to vaccination requirements, it did so in the context of a major outbreak of measles—a dangerous and potentially fatal disease that had once been declared eradicated in the United States. Eliminating those exemptions was crucial to maintaining "herd immunity" against measles, as well as other diseases. The extremely contagious nature of measles, combined with limitations on the number of people who can be protected through vaccination, requires that the vaccine be given to virtually everyone who can safely receive it. The American Medical Association, the Medical Society of the State of New York, and the New York State American Academy of Pediatrics believe that eliminating religious objections was clearly in the best interest of public health.

ARGUMENT

I. Measles Is Dangerous and Deadly.

Measles can debilitate and kill in astonishing numbers. It is thought that before scientists developed a vaccine, measles killed seven to eight million children each year. Martin Ludlow, Stephen McQuaid, Dan Milner, Rik L. de Swart, and W. Paul Duprex, *Pathological Consequences of Systemic Measles Virus Infection*, 235 Journal of Pathology 253, 253 (2015). Even when measles does not kill, it sends as many as one in five unvaccinated people to the hospital. Centers for Disease Control, *Complications of Measles*, https://www.cdc.gov/measles/symptoms/complications.html. Children who contract measles may develop complications including pneumonia and encephalitis, which can lead to permanent deafness or intellectual disability. *Id*. Unvaccinated pregnant women with measles can give birth prematurely, or have a low-birth-weight baby. *Id*.

When unchecked by vaccination, measles is extremely contagious. For infectious diseases, epidemiologists estimate the basic reproductive number (called R_0), which is the average number of other people that an infectious person will infect with an agent in a completely susceptible population. Peter G. Smith, Concepts of Herd Protection and Immunity, 2 Procedia in Vaccinology 134, 135 (2010). For SARS-CoV-2, the virus that causes COVID-19, one study estimated an R_0 between 2.43 and 3.10 as the virus raged through Italy in the early part of the pandemic. Marco D'Arienzo and Angela Coniglio, Assessment of the SARS-CoV-2 Basic Reproduction Number, R₀, Based on the Early Phase of COVID-19 Outbreak in Italy, 2 Biosaf Health 57, 57 (2020). In the movie Contagion, the audience is meant to be shocked by a virus whose R_0 is at least 4. The R_0 for measles is as high as 18. Catherine I. Paules, Hilary D. Marston, and Anthony S. Fauci, Measles in 2019 - Going Backward, 380 New England Journal of Medicine 2185, 2185 (2019) ("Measles in 2019"). Few diseases spread more easily through an unvaccinated population.

II. Near-Perfect Vaccination Rates Are Essential to Containing Measles Through Herd Immunity.

For infectious diseases, "herd immunity" is achieved when enough members of a population are immune from the disease that it can no longer spread. Even though some members of the population are susceptible to the disease, the immune "herd" surrounds them and protects them from those carrying the infection. For people who cannot be vaccinated for medical reasons, such as a suppressed immune system, herd immunity is their only protection. Without herd immunity, vulnerable populations are at grave risk. In 2015 in Shanghai, a single child with measles in a pediatric oncology clinic caused an outbreak that sickened 23 others, causing complications in 13 and killing 5. Yan-Ling Ge, Xiao-Wen Zhai, Yan-Feng Zhu, Xiang-Shi Wang, Ai-Mei Xia, Yue-Fang Li, and Mei Zeng, *Measles Outbreak in Pediatric Hematology and Oncology Patients in Shanghai, 2015*, 130 Chinese Medical Journal 1320, 1320 (2017).

The more contagious a disease is, the higher the proportion of the population that must be immune in order to achieve herd immunity. For example, smallpox, which has a lower R_0 than measles, was completely eradicated when the world exceeded its goal of an 80% vaccination rate. Tae Hyong Kim, Jennie Johnstone, and Mark Loeb, *Vaccine Herd Effect*, 43 Scandinavian Journal of Infectious Diseases 683, 683 (2011). Herd immunity for measles, which is more contagious than smallpox, requires 93% to 95% of the population to be immune. *Measles in 2019* at 2186. Below this number, there is a risk of outbreaks.

To achieve immunity of 93% to 95% requires "near-perfect vaccination coverage." Measles in 2019 at 2186. This is for two main reasons. First, as mentioned before, some people cannot safely be vaccinated because of underlying medical conditions. Second, while the measles vaccine is one of the most highly effective vaccines available, it is only 97% effective, meaning 3% of vaccinated people will still be susceptible. *Measles in 2019* at 2186. Given these two limitations, herd immunity cannot be achieved unless virtually everyone who can be vaccinated is vaccinated. Allowing exemptions will lead to outbreaks among not only those who claim an exemption, but also some who are vaccinated. Health Consequences of Religious and Philosophical Exemptions from Immunization Laws: Individual and Societal Risk of Measles, 281 Journal of the American Medical Association 47, 51 (1999). "Near-perfect vaccination coverage" also requires that nearly everyone be vaccinated in every community. A near-perfect vaccination rate on average, nationwide or statewide, will not prevent the spread of disease in a community where substantial numbers of people are unvaccinated. Paul Fine, Ken Eames, and David L. Heymann, "Herd Immunity": A Rough Guide, 52 Clinical Infectious Diseases 911, 914 (2011).

When exemptions have been allowed for philosophical or religious reasons, vaccination rates in some communities have fallen far below "near-perfect," with predictable results. Since measles was declared eliminated in the United States in 2000, the number of nonmedical exemptions for vaccines generally has grown. Jana Shaw, Emily M. Mader, Brittany E. Bennett, Olesya K. Vernyi-Kellogg, Y. Tony Yang, and Christopher P. Morley, Immunization Mandates, Vaccination Coverage, and Exemption Rates in the United States, 5 Open Forum Infectious Diseases 130 (2018). A nationwide study of state laws and policies found that permitting philosophical or religious exemptions was associated with lower vaccination rates, including vaccination for measles. Id. Further analysis of state immunization laws, using pertussis as an outcome, found that states with the most effective immunization laws, including a prohibition on religious exemptions, experienced almost 3.5fold lower rates of pertussis compared to states with the most lax immunization rules. W. David Bradford and Anne Mandich, Some State Vaccination Laws Contribute to Greater Exemption Rates and Disease Outbreaks in the United States, 34 Health Affairs 1383 (2015).

Lowered vaccination rates allowed a resurgence of measles; in 2014 an outbreak in an underimmunized Amish community in Ohio resulted in 383 cases—more than half of the United States total that year. Manisha Patel, Adria D. Lee, Susan B. Redd, Nakia S. Clemmons, Rebecca J. McNall, Amanda C. Cohn, and Paul A. Gastañaduy, *Increase in Measles Cases* — *United States, January 1–April 26, 2019*, 68 Morbidity and Mortality Weekly Report 402, 403 (2019). The 2019 outbreak of measles in Rockland County was the natural consequence of that community's relatively low vaccination rate, and a preview of things to come if religious exemptions are not eliminated.

III. Protection from Other Diseases Also Depends on High Vaccination Rates and Herd Immunity.

Measles is not the only disease that requires high vaccination rates to produce herd immunity. Pertussis, which hospitalizes half the infants it infects, has an *R*₀ similar to that of measles, with a correspondingly high threshold for herd immunity: 92% to 94%. Centers for Disease Control, *Pertussis (Whooping Cough): Fast Facts*, https://www.cdc.gov/pertussis/fast-facts.html; *Concepts of Herd Protection and Immunity* at 136. Cases of pertussis have been rising since the 1980s; in 2012 there were 48,277 cases reported by states, representing the highest number since 1955. *Pertussis (Whooping Cough): Fast Facts*. In New York State, the annual rate of pertussis is 3.07 per 100,000. Centers for Disease Control, *2018 Final Pertussis Surveillance Report*, https://www.cdc.gov/pertussis/downloads/pertuss-surv-report-2018-508.pdf. For diphtheria and polio, which were significant killers of children before the

development of vaccines, the threshold for herd immunity is greater than 80%. Con-

cepts of Herd Protection and Immunity at 136. These diseases have been eliminated

from the United States, but so was measles. An outbreak in a community with low

vaccination rates would be devastating and entirely preventable.

IV. The New York Legislature Considered Evidence of the Importance of Herd Immunity and the Impact of Religious Exemptions.

The Appellants claim that

neither the Assembly nor the Senate, nor either of their Health Committees, engaged in any fact-finding process to determine [a] the number of active cases of measles in New York State; [b] the proportion of New York State's population which is vaccinated; [c] the proportion of unvaccinated individuals that hold religious exemptions; [d] the actual risk, if any, posed to vaccinated persons by those who do not vaccinate based on their sincerely-held religious beliefs; [e] whether those who had contracted measles were, or were not, vaccinated against the disease; [f] whether those who contracted measles did, or did not, have religious exemptions to vaccination; [g] whether any case of measles likely had been contracted from such an unvaccinated minor; and [h] whether "herd immunity" had been achieved in and throughout the State of New York.

Appellants' Br. at 10-11. This is plainly incorrect. The undersigned *amici* submitted

statements to the Legislature in support of the bill. The statement submitted by the

Medical Society of the State of New York and the American Academy of Pediatrics

was joined by twenty-six other organizations with expertise in medicine and public

health.¹ Moreover, the public record of the floor debate on the bill shows that its sponsors had the facts the Appellants claim were missing, and that they educated other legislators about those facts before voting on the bill. For example:

- The Senate Memorandum in Support of Legislation noted the "precipitously low immunization rates" in the communities where New York's outbreaks were concentrated (addressing Appellants' point [b]). A-219.
- The Assembly Memorandum in Support of Legislation explained that the Centers for Disease Control's goal is a 95% vaccination rate, and that "there are at least 285 schools in New York with an immunization rate below 85%, including 170 schools below 70%" ([b], [h]). A-222.
- Senators learned in debate on the bill that:
 - Herd immunity requires a 95% vaccination rate ([h]). A-293.

¹ These were the American Nurses Association - New York; Associated Medical Schools of New York; Autism Science Foundation; Citizen Committee for Children of New York, Inc.; Children's Defense Fund-New York; Erie County Department of Health; Ithaca Is Immunized; Kimberly Coffey Foundation; Nurses Who Vaccinate; March of Dimes; Meningitis B Action Project; Nurse Practitioner Association New York State; New York American College of Emergency Physicians; NY Chapter American College of Physicians; NYS Academy of Family Physicians; NYS Association of County Health Officials; NY Occupational and Environmental Medical Association; NY State Neurological Society; NY State Neurosurgical Society; NYS Ophthalmological Society; NYS Society of Otolaryngology-Head and Neck Surgery; NYS Public Health Association; New York State Society of Anesthesiologists, Inc.; The New York State Radiological Society; Schuyler Center For Analysis and Advocacy; and The Children's Agenda.

- Evidence from the New York City Health Commissioner showed that religious objections have driven the large gap between actual immunization rates and the immunization rates needed for herd immunity ([b], [c], [h]). A-295–97.
- The New York City Department of Health noted that one infected child with a religious exemption resulted in 44 additional cases of measles, 26 of whom were fellow students with religious exemptions ([d], [e], [f], [g]). A-297.
- California's elimination of nonmedical exemptions increased immunizations by five percent, achieving herd immunity ([c]). A-297–98, 313.
- The proportion of individuals with religious exemptions has steadily climbed statewide, and increases in certain neighborhoods have been more dramatic ([b], [c]). A-300–01.
- The three states without religious exemptions (California, Mississippi, and West Virginia) had not suffered from the then-current outbreak of measles ([d]). A-307.
- Potential defects in measles immunizations given between 1965 and 1975 have resulted in less immunity than the percentage of immunized individuals would indicate ([d], [h]). A-311.

- On the day the bill was passed, there were 266 cases of measles in Rockland County ([a]). A-349.
- Assembly Members learned in debate on the bill that:
 - There is an inverse relationship between the percentage of children who are immunized and the percentage of children who have a religious exemption; in schools with an immunization rate between 50% and 69% (well below the standard for herd immunity), the percentage of children with a religious exemption was 22.2% ([b], [c], [h]). A-374, 409.
 - In the State of New York, seventy-three new cases of measles were reported in May 2019, and five more in June 2019 ([a]). A-380.
 - California's elimination of nonmedical exemptions increased immunizations by five percent ([c]). A-387.
 - After New York's measles outbreak began, the Rockland County Health Department gave 22,834 vaccinations, compared to a county population of 330,000 ([b]). A-396.
 - The high proportion of unvaccinated children is causing physicians to recommend vaccination for infants earlier than guidelines suggest ([d]).
 A-397.

- In Rockland County, 77.8% of measles patients had no immunizations, and another 14% had an unknown number of immunizations ([e]). A-398.
- Six schools in Rockland County had religious exemption rates above 20%, with another 17 schools over 8% ([c]). A-398–99.
- Herd immunity for measles requires 95% to 97% immunity ([h]). A-411.

The evidence before the Legislature was accurate and consistent with the scientific literature discussed in this brief. Eliminating religious exemptions for vaccine requirements was a sound, evidence-based decision in the interest of public health.

CONCLUSION

Maintaining near-perfect vaccination rates is crucial to preventing a resurgence of measles and other diseases. New York's experience has shown that religious exemptions cause vaccination rates to fall below that level, resulting in dangerous and potentially deadly outbreaks. The decision to eliminate these exemptions will protect the health and the lives of New Yorkers.

Dated:	New York, New Yo	ork
	September, 2020)

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that I caused to be served true and correct copies of the fore-

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