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Relative Roles of Medical Interventions and Infrastructure in an Urban Community's Infant Mortality Rate: 100 Years of Infant Mortality in the City of Worcester

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Background

The infant mortality rate (IMR), number of deaths in children < 1 year of age per 1000 live births, is a sensitive measure of population health. This reflects overlap between societal factors impacting infant mortality and those affecting the larger community, such as socioeconomic status, nutrition, living conditions, education, employment and access to health care.

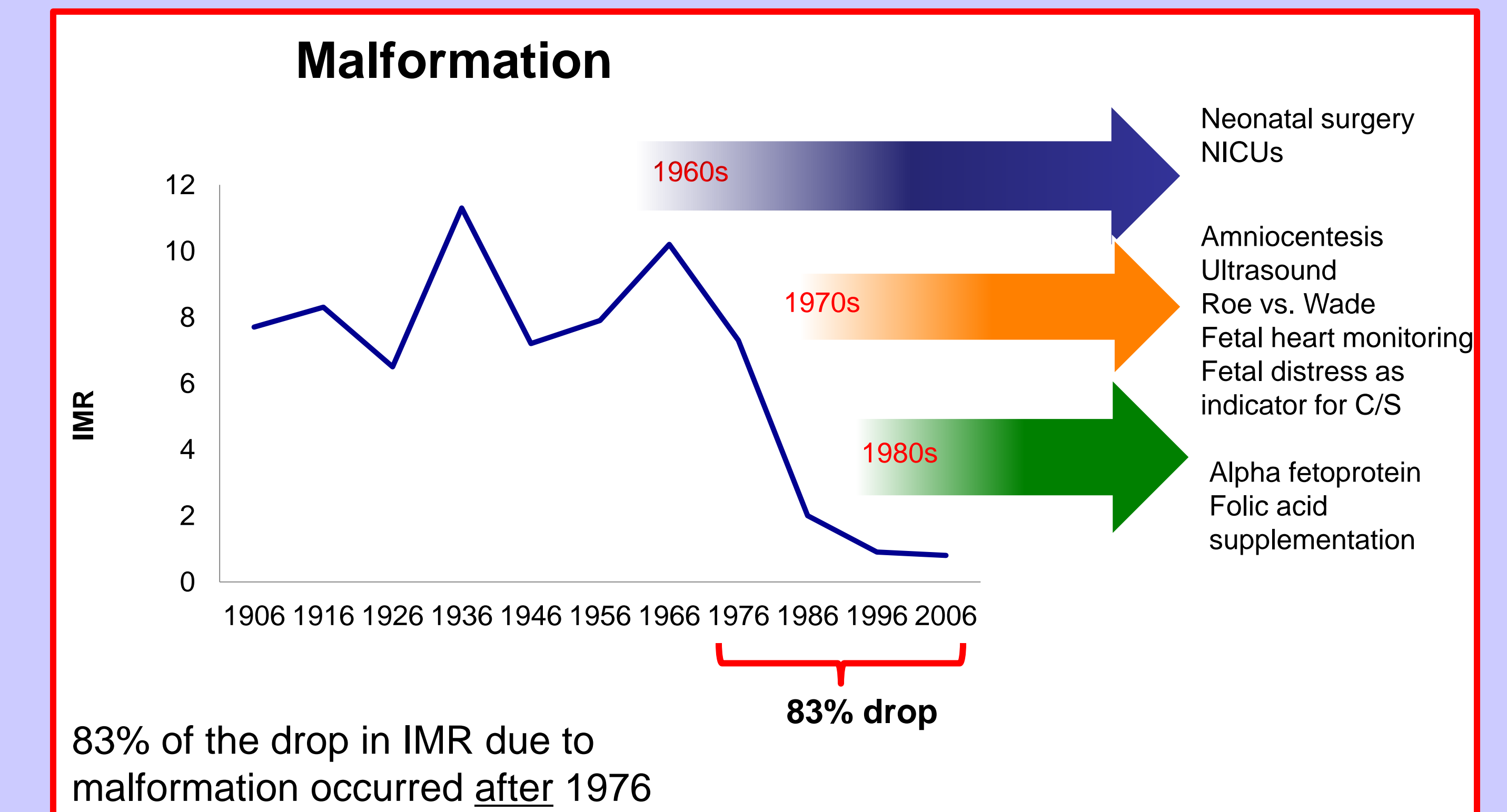
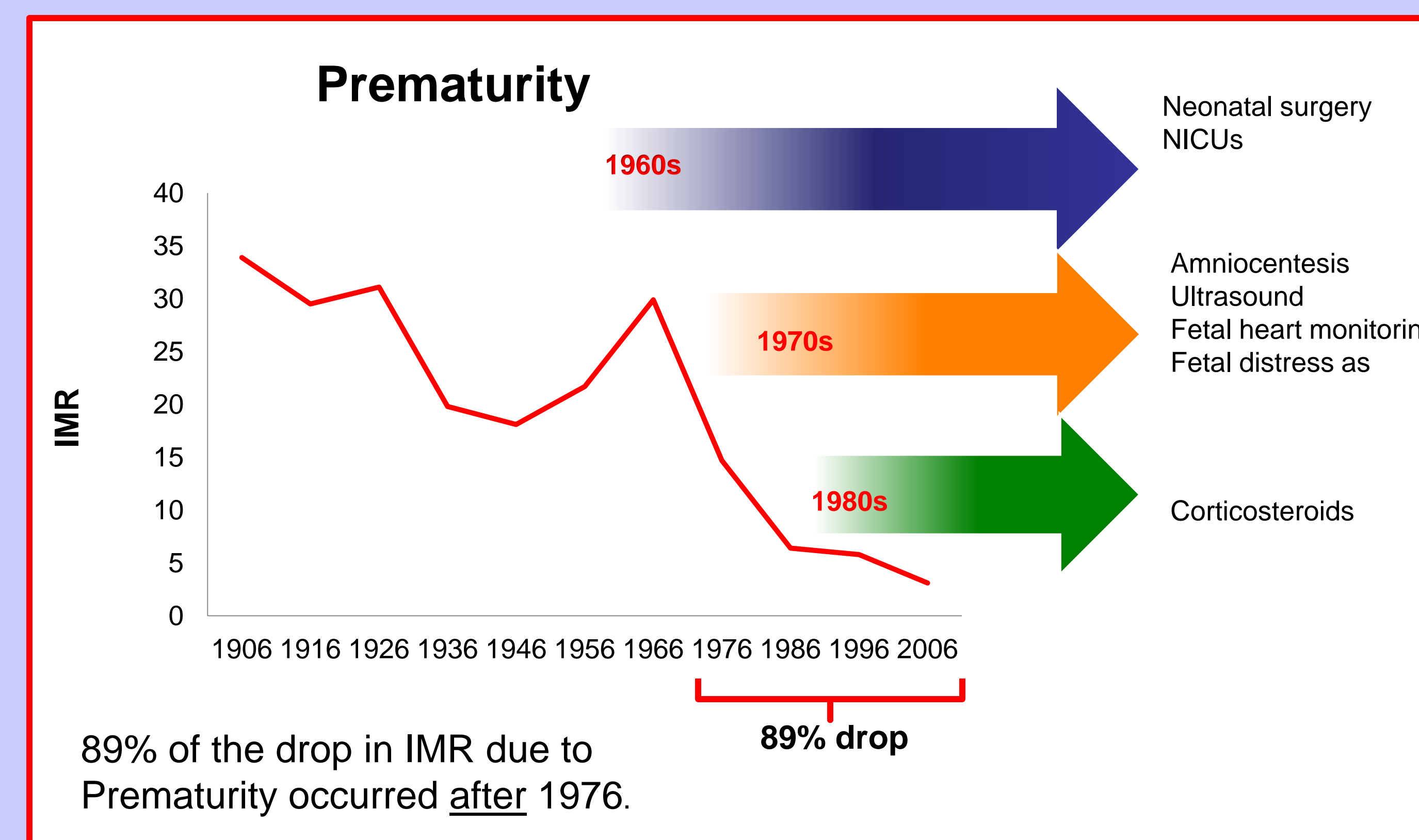
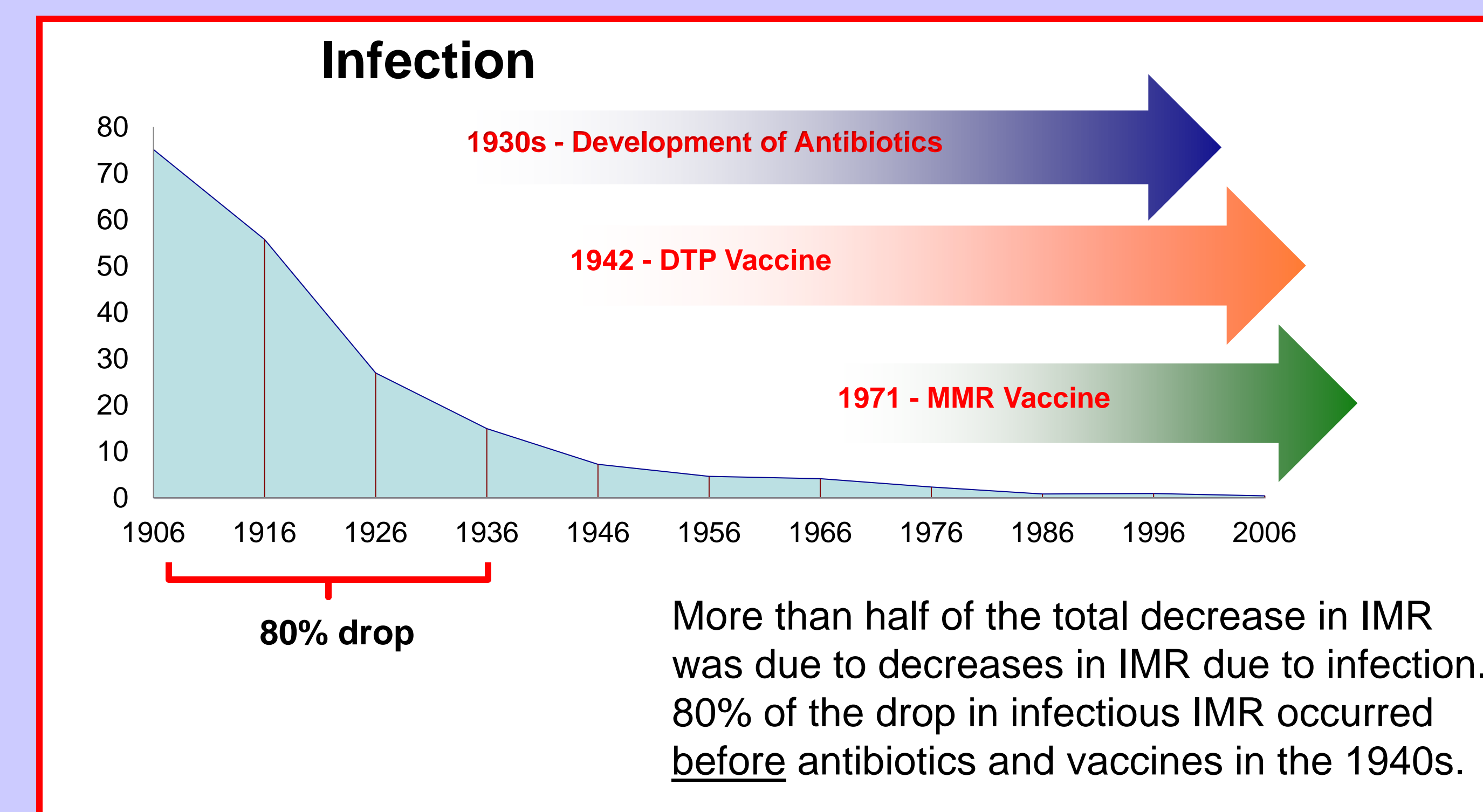
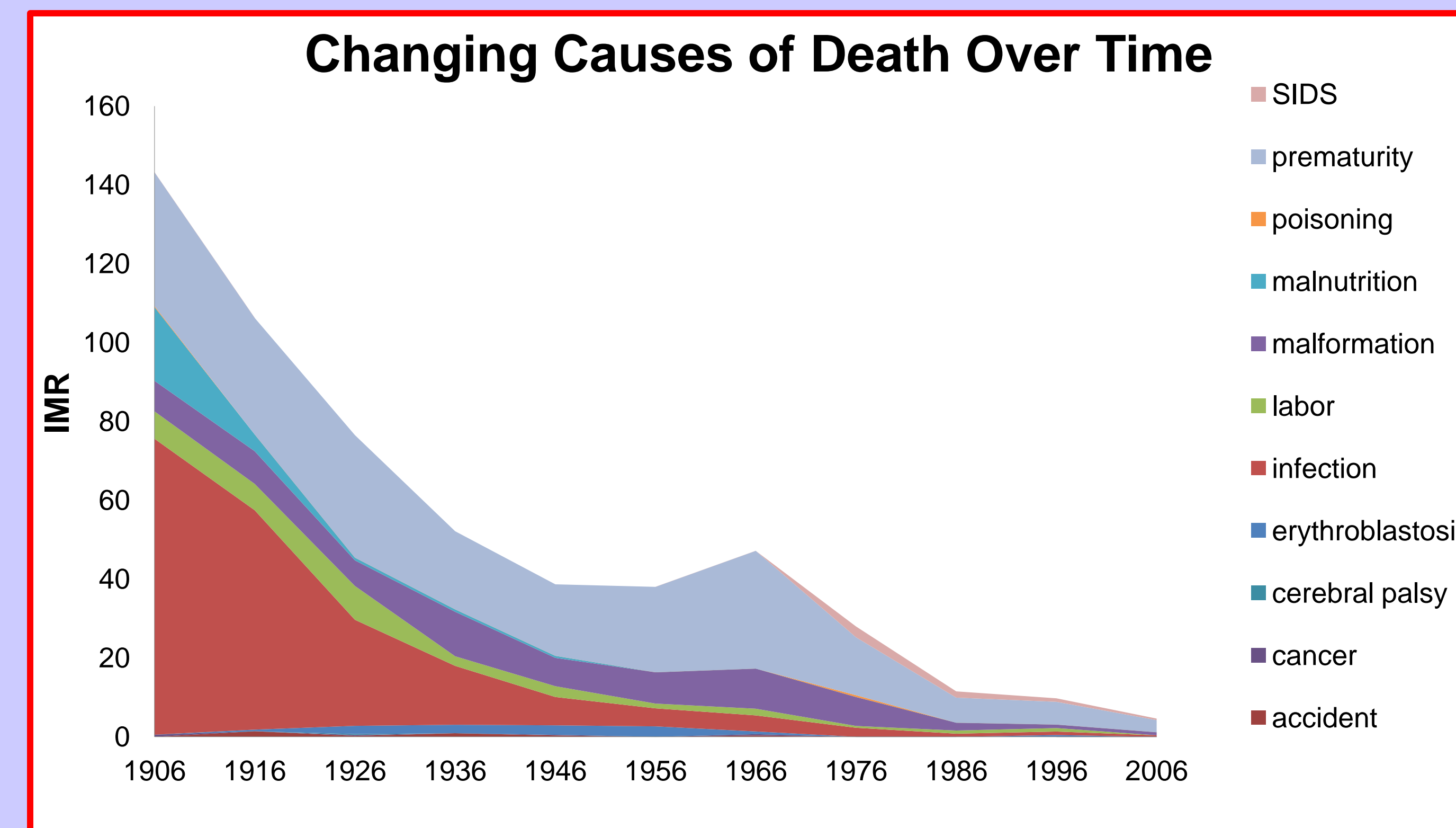
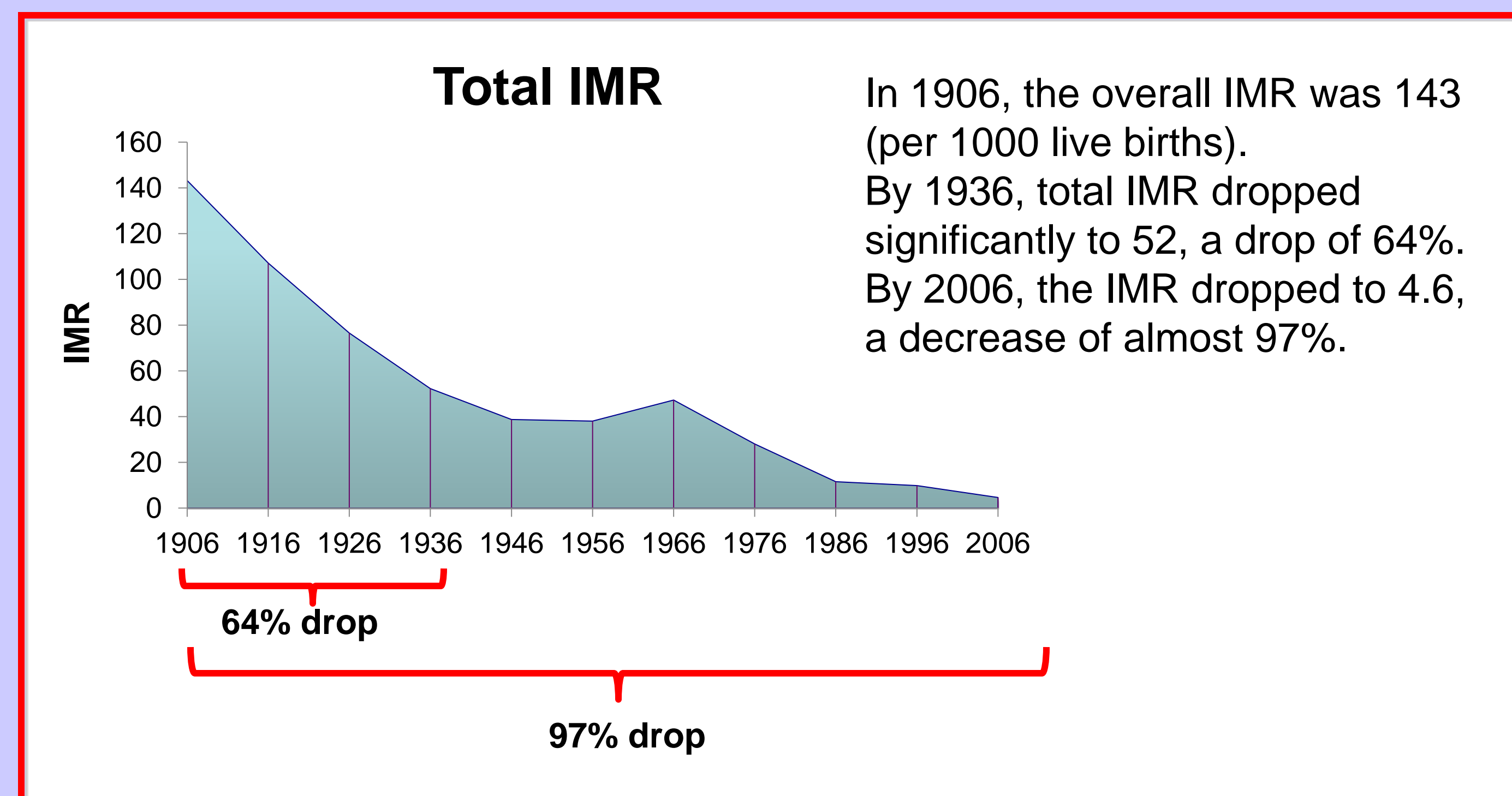
Objectives

We studied historic trends in the IMR of the city of Worcester, MA, the second largest city in New England, over one hundred years. We evaluated trends in the overall infant mortality rate as well as by specific causes of death. We further looked at known changes in medical innovation as well as community living conditions that may have had an effect on these rates.

Methods

From August - September 2012, 3,045 infant death certificates were analyzed. Data was collected in 10-year intervals between 1906 and 2006, including: date of death, age of infant, cause of death, and mother's place of birth. Specific causes of death were transformed into general categories. A subsequent comparative analysis was performed.

Results



Conclusion

- Worcester's IMR has undergone a dramatic reduction over 100 years, driven in large part by reductions in infant deaths from infectious causes.
- A large part of the reduction in infectious IMR occurred by 1936, prior to the widespread availability of antibiotics and vaccines against infectious diseases starting in the 1940s.
- Changes in public health infrastructure, water, sewage and housing, and access to better nutrition and education likely played a significant role in decreased infectious IMR prior to the development of medical interventions.
- A number of medical developments are likely responsible for the decreased IMR due to malformations and prematurity seen after 1976.
 - 1960s - Advent of neonatal surgery, introduction of Neonatal Intensive Care Units (NICUs).
 - 1970s - Development of amniocentesis (for lung maturity and genetic testing), ultrasound (for dating), Roe vs. Wade and use of fetal heart monitors and fetal distress as indications for cesarean delivery.
 - 1980s - Alpha-fetoprotein testing, folic acid supplementation and corticosteroids for fetal lung maturation.
- The large decrease in IMR due to infectious causes over the last 100 years highlights IMR's sensitive relationship to societal factors and suggests that deteriorations in living conditions during difficult economic times could result in high and increasing IMRs among vulnerable subpopulations.
- We propose that interventions addressing societal factors could have the greatest impact in preventing infant mortality in Worcester.