

BULGARIA: IMPACT OF THE UNIVERSAL NEWBORN HBV VACCINATION PROGRAMME: 20 YEARS AFTER

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BACKGROUND

1. Hepatitis B in Bulgaria

- Bulgaria is a country in an area of intermediate endemicity of Hepatitis B, with 3-5% HBV carrier prevalence and more than 30% of the population with serological evidence of HBV infection.
- All acute cases of HBV infection clinically manifested with jaundice as well as all laboratory positive cases are subject of mandatory notification in Bulgaria since 1983. The EU case definition¹ and case classification have been adopted since 2005; since 8 July 2011 the EU case definitions of 2008 are applied.²

¹COMMISSION DECISION of 19 March 2002 laying down case definitions for reporting communicable diseases to the Community network under Decision No 2119/98/EC of the European Parliament and of the Council (notified under document number C(2002) 1043) 2002/253/EC)

²COMMISSION DECISION of 28/IV/2008 amending Decision 2002/253/EC laying down case definitions for reporting communicable diseases to the Community network under Decision No2119/98/EC of the European Parliament and of the Council (Text with EEA relevance)

2. HEPATITIS B IMMUNIZATION IN BULGARIA

HBV Vaccines used: Recombinant DNA vaccines

Immunization Schedule: 0 – 1 – 6

At birth → 1 month of age → 6 months of age
(within 24 hours)

Immunization strategy:

- 1983 – 1987 No immunization
- January 1988 – July 1991 Selective immunization of newborns to HBsAg - positive mothers
- August 1991 Start of the universal newborn immunization
- 1992 up to date Routine universal newborn HBV immunization

PURPOSE OF THE ANALYSIS

- To assess the impact of the universal newborn HBV vaccination programme 20 years after adoption of the programme:
 - impact on the incidence of acute manifested HBV infections in Bulgaria during the period 1988-2010;
 - changes in hepatitis B epidemiology in Bulgaria.

MATERIALS AND METHODS

- Age-specific annual incidence of acute HBV infection in Bulgaria is estimated, based on the data obtained from the National surveillance system, requiring compulsory notification and laboratory confirmation of acute clinically manifested cases of HBV (*Regulation No 21 of the MoH from 18 July 2005 on the procedure for registration, notification and reporting of communicable diseases, State Gazette, No 62 of 29 July 2005, amended 8 July 2011, State Gazette, No 52 of 8 July 2005*).
- Surveillance on the universal newborn HBV vaccination is based on the reports from the GPs to Regional public health authorities (RHI) and the reports from the RHI to the Immunization Information System. The national immunization coverage with HBV vaccine is estimated at the NCPHP.

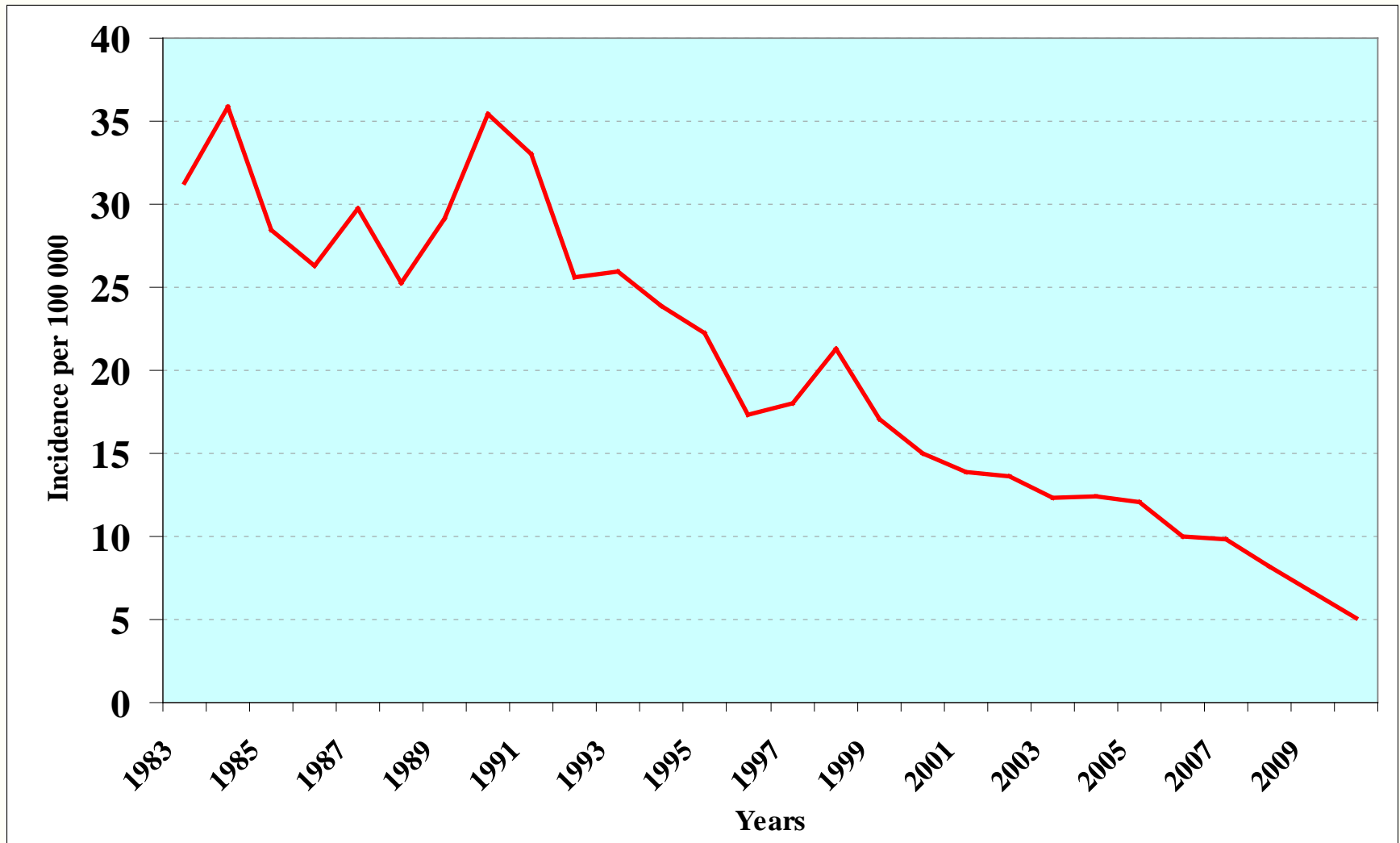
HEPATITIS B IMMUNIZATION COVERAGE IN NEWBORNS IN BULGARIA, 1988 – 2010

YEAR	NUMBER OF IMMUNIZED INFANTS (HBV-3)	IMMUNIZATION COVERAGE (%)
1988	1 300 до 2 886	No data
1989	861	No data
1990	1 646	No data
1991	≈ 20 000	No data
1992	68 393	71.3%
1993	78 359	95.7%
1994	73 519	94.2%
1995	70 565	95.4%
1996	66 591	93.5%

1997	46 144	77.2%
1998	72 384	97.1%
1999	65 988	97.3%
2000	63 756	93.7%
2001	63 143	93.3%
2002	57 647	88.3%
2003	65 895	95.8%
2004	61 673	93.8%
2005	62 576	96.0%
2006	63 629	95.9%
2007	63 378	95.4%
2008	65 808	95.7%
2009	68 043	95.6%
2010	68 527	95.0%

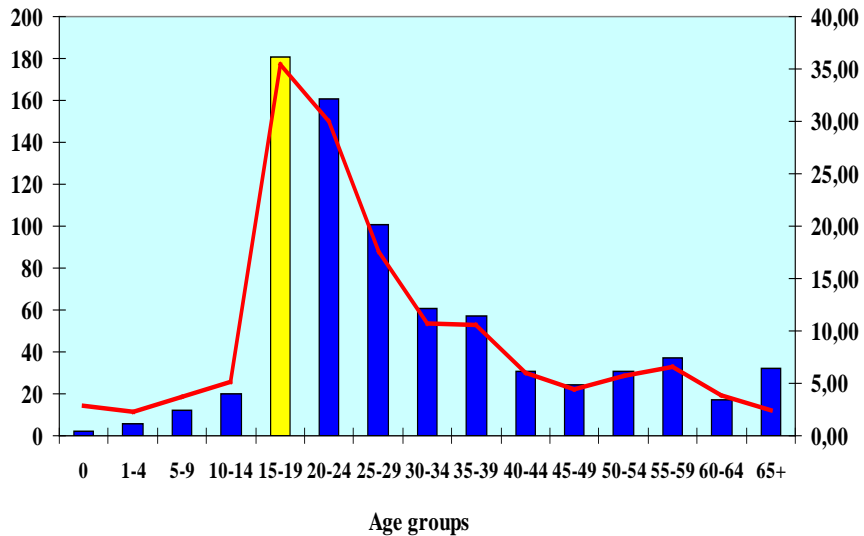
As of 2010, a total of 1 270 618 children had been fully vaccinated with 3 doses of hepatitis B vaccine.

ACUTE HEPATITIS B INCIDENCE IN BULGARIA, 1983 – 2010

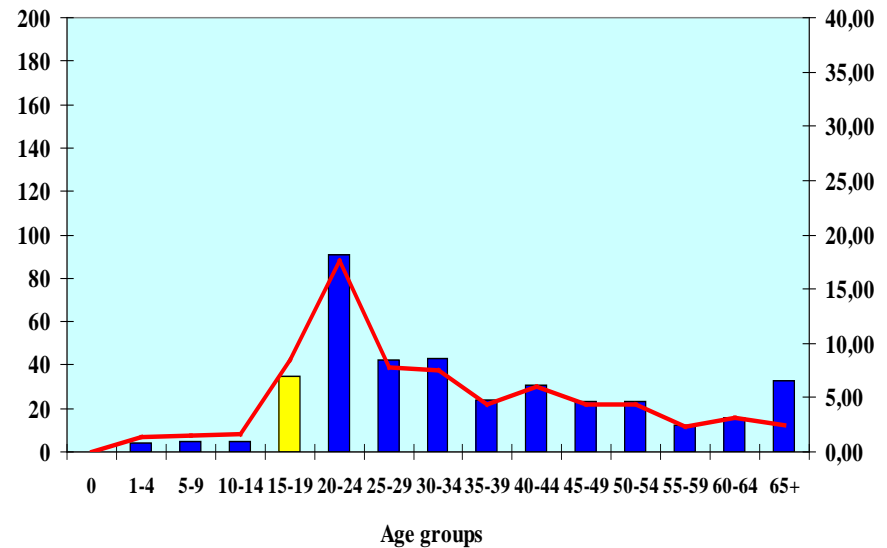


NUMBER OF ACUTE HBV CASES AND INCIDENCE RATE BY AGE GROUPS IN BULGARIA IN 2006 AND 2010

2006



2010



ACUTE HEPATITIS B INCIDENCE IN BULGARIA, 1983 – 2010

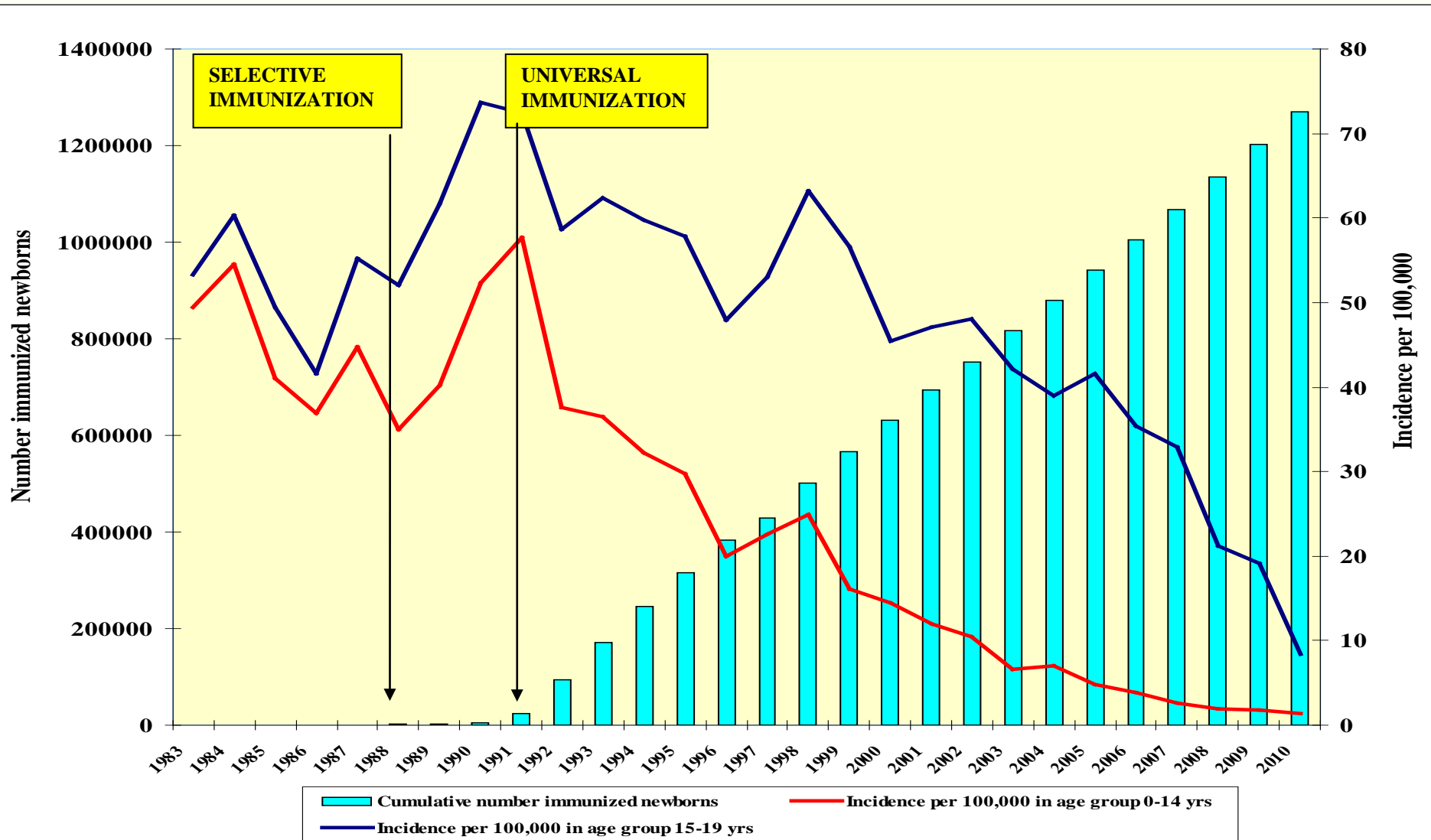
- **Before the introduction of the immunization**

HBV incidence in newborns and children 1-3 yrs of age was 31.1 and 31.6 per 100 000. The incidence was highest in persons 4-7, 15-19 and 20-29 years of age: 55.9; 52.0 and 50.2 per 100 000 respectively.

- During 1988-1991, **the period of selective immunization**, the HBV incidence declined (40.9%) only in infants.
- The greatest decline of acute hepatitis B in Bulgaria occurred after the adoption of the strategy of **universal newborn HBV vaccination**.
 - Among children 0 to 14 years of age the decline of the HBV incidence (1991 to 2010) was **97.6%**.
 - Among adolescents 15-19 years old the decline of the HBV incidence (1991 to 2010) was **88.4%**.

This decline corresponded to the gradual increase of the cumulative number of immunized cohorts.

CUMULATIVE NUMBER OF IMMUNIZED WITH HBV VACCINE NEWBORNS AND HEPATITIS B INCIDENCE (PER 100 000) IN CHILDREN 0-14 AND 15-19 YEARS OF AGE IN BULGARIA, 1983 – 2010

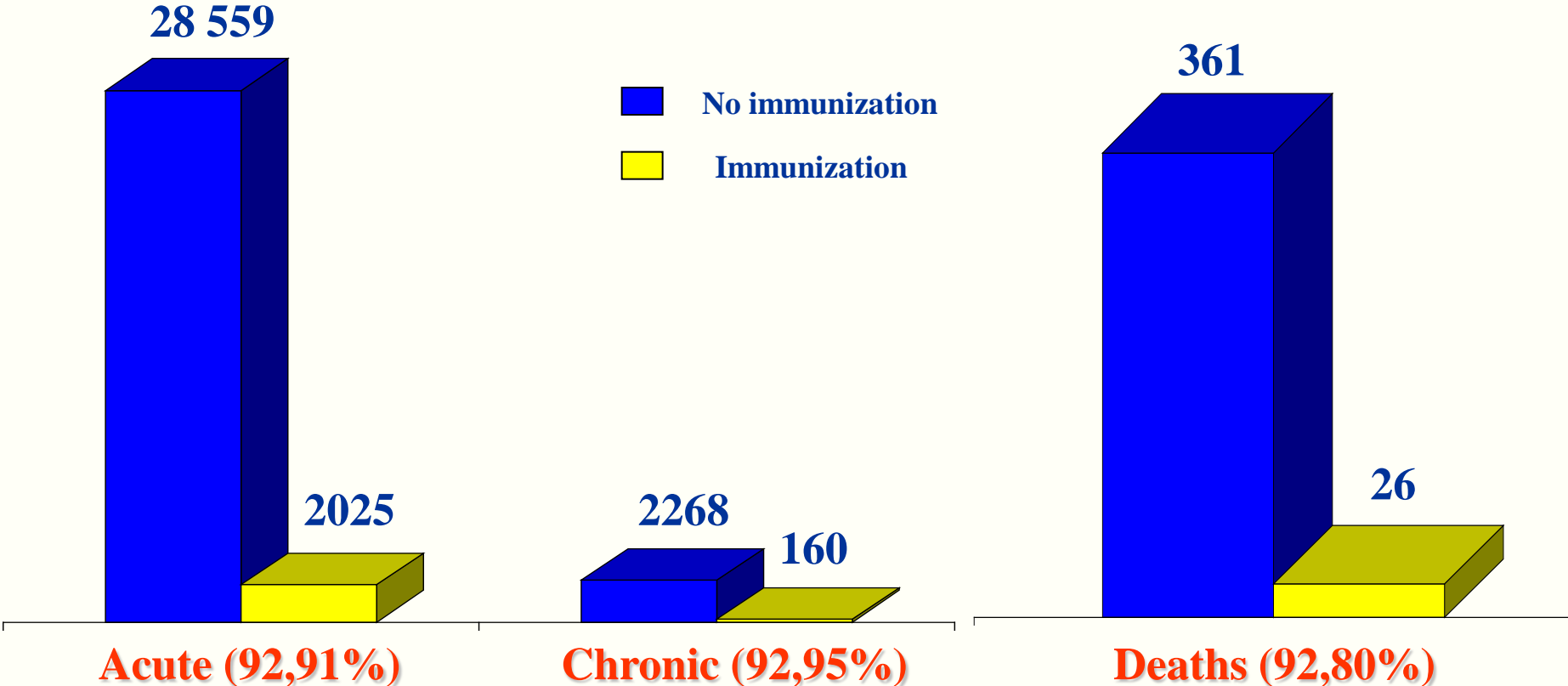


COST-BENEFIT ASSESSMENT OF INTRODUCTION OF UNIVERSAL HBV VACCINATION OF NEWBORNS IN BULGARIA

- A model-based economic assessment of introduction of universal newborn HBV vaccination in Bulgaria was made by using cost-benefit analysis and comparing two vaccination strategies: "without vaccination" and "universal vaccination of all newborns“:
 - the time horizon of the assessment covers a period of 100 years;
 - a static model of the evolution of acute and chronic HBV infection was used;
 - inputs used in the model: the 1992 birth cohort (88,000), official and published data and estimates for age-specific mortality rates and HBV prevalence, vaccine coverage and efficacy, duration of immunity and the direct medical costs of treating HBV infection and the official data from public tenders for hepatitis B vaccine purchase.
- The capital costs (equipment, building and land) as well as indirect costs were not taken into account.

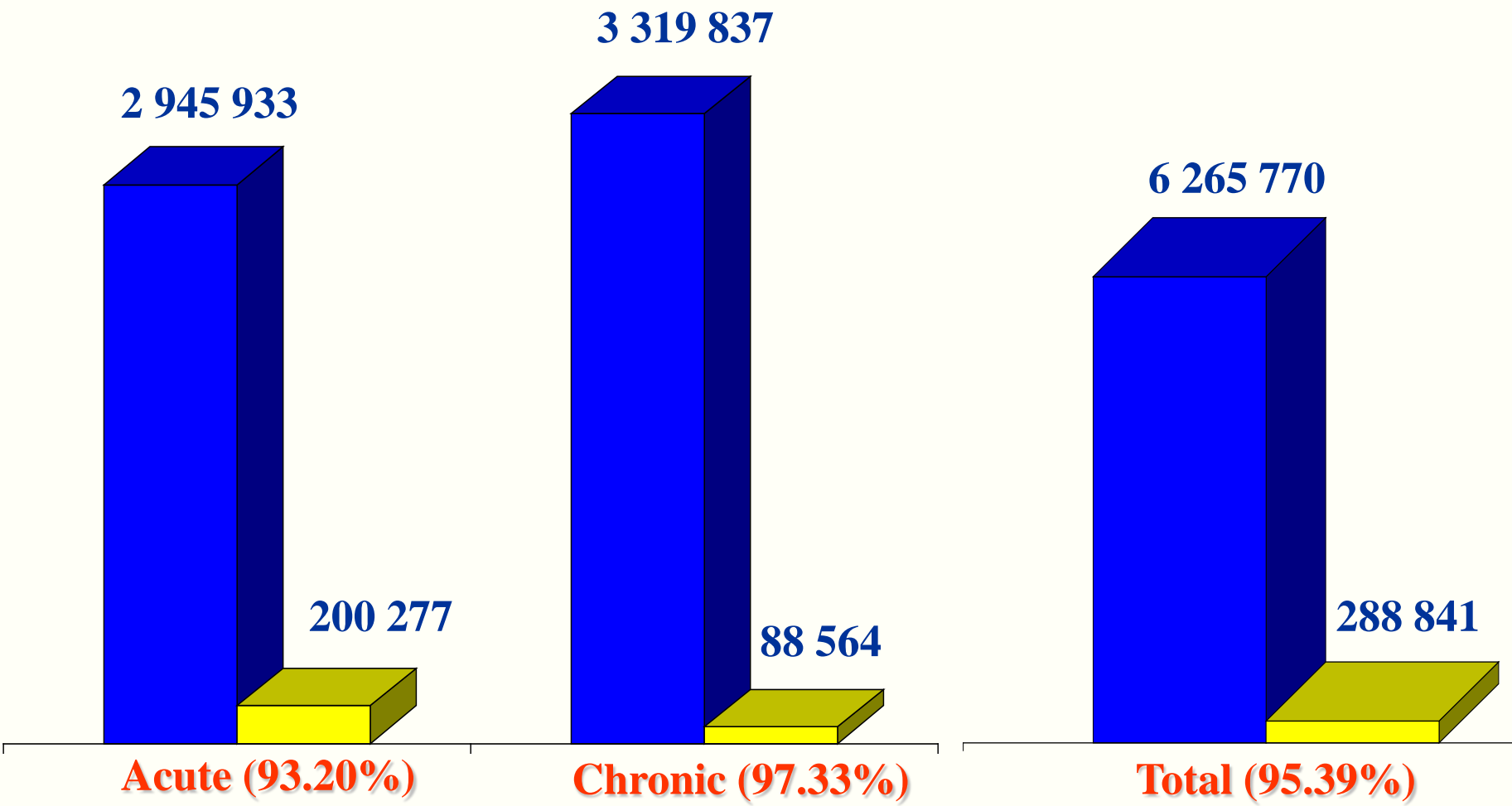
COST-BENEFIT ASSESSMENT OF INTRODUCTION OF UNIVERSAL HBV VACCINATION OF NEWBORNS IN BULGARIA

*Expected number of HBV cases and deaths
Accumulated yearly number per 1 cohort for 100 years*



COST-BENEFIT ASSESSMENT OF INTRODUCTION OF UNIVERSAL HBV VACCINATION OF NEWBORNS IN BULGARIA

Economic burden of HBV infection
Direct medical costs (BGN) related to HBV infection



COST-BENEFIT ASSESSMENT OF INTRODUCTION OF UNIVERSAL HBV VACCINATION OF NEWBORNS IN BULGARIA

- The cost-benefit assessment showed that universal vaccination of all newborns would significantly reduce the expected number of HBV cases and deaths and total medical costs related to infection.
- Vaccination would be both medically and economically beneficial (with benefit-to-cost ratio of 1.21).
- The economic effect of the vaccination would be realized 19 years after introduction of the programme when the benefits should exceed its costs.
- The benefit-to-cost ratio was sensitive to the discount rate on vaccine cost and treatment cost. The higher vaccine cost and lower treatment costs influence negatively on benefit-to-cost ratio [1].

1. Kurchatova AM. "Economic evaluation of universal immunization of all newborns against hepatitis B viral infection in Bulgaria". Ph.D. thesis. National Centre of Infectious and Parasitic Diseases, Bulgaria; 2001.

CONCLUSIONS (1)

- The immunization strategy focusing on universal newborn vaccination beginning at birth has been implemented with considerable success during the last 20 years in Bulgaria.
- The universal newborn vaccination along with the complex of public health measures have led to the significant decrease of the HBV infection in Bulgaria as a whole.
- The annual incidence of reported acute HBV cases among children 0-14 yrs of age and adolescents 15-19 yrs of age decreased significantly – by 97.6% and 88.4% respectively.

CONCLUSIONS (2)

- The full effect of the introduced in August 1991 immunization program, dramatically reducing the incidence of acute hepatitis B in targeted age groups is expected to be achieved in 2011, when all adolescents up to 19 years of age will be protected by the immunization.
- The annual incidence of reported acute HBV cases among young adults 20-24 yrs is the highest at present. The decline of HBV incidence in this age group is expected during the next 5 years in correspondence with the gradual increase of the number of covered by immunization cohorts.
- The economic evaluation and the epidemiological data are confirming the high effectiveness of the HBV vaccination programme introduced in 1991 in Bulgaria.