

The Decline of Hepatitis B Virus Infection in the Kingdom of Saudi Arabia

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Agenda....

- Summary of the epidemiology of HBV in Saudi Arabia
- Hepatitis B vaccination: Integration into EPI and initial evaluation
- Assessment of the impact on the prevalence of HBV markers in children
- Changing epidemiology of HBV in unvaccinated adult population
- Ultimate goal: Reduction of HBV –related liver diseases
- Conclusions

Saudi Arabia

Middle Eastern Country:
Arabian Peninsula;
on the Red sea

Population:
1991 – 10 million
2001 – 16 million
> 50% younger than 40y

Homogeneous **culture / religion**

Free health care within a national system

Economic status: High GNP

Rapid Education and Social development



Epidemiology of HBV in Saudi Arabia

- **HBV is endemic in Saudi Arabia**
 - In apparently healthy adults, **7 - 8% are HBsAg "carriers"**; At least one marker is positive in **60 -70% of the population**
 - In children: HBsAg **6.7%**; any marker **20%**
- **Characteristics**
 - Horizontal transmission; Acquisition during early life
 - Regional variations in prevalence of HBsAg in asymptomatic persons
- **Chronic HBV infection** : a major cause of acute hepatitis, liver cirrhosis and hepatocellular carcinoma [HCC]

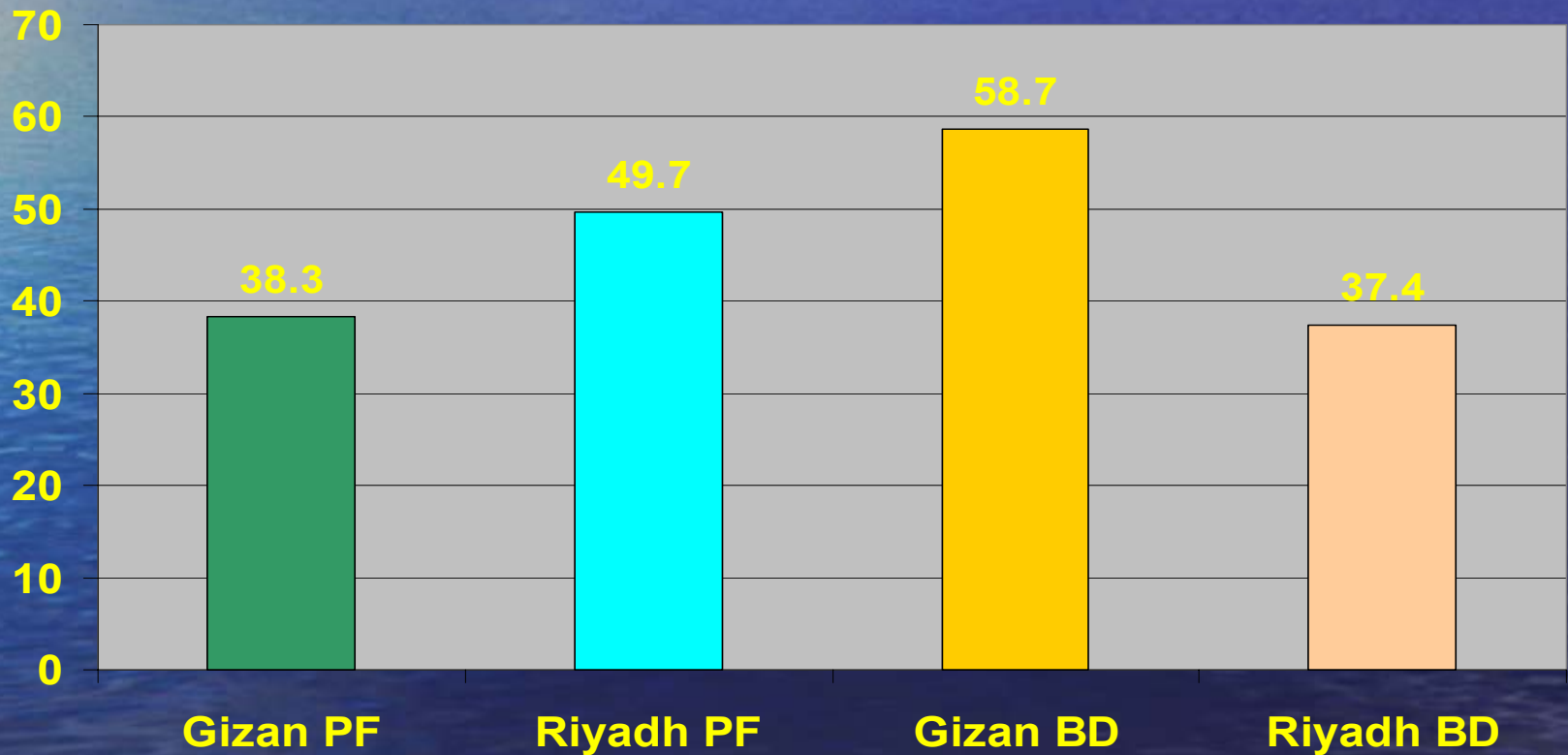
Regional variation in the prevalence of HBV in Saudi Arabia [pooled data from surveys up to 1988]



Regional variation in the prevalence of HBsAg in Saudi Arabia.

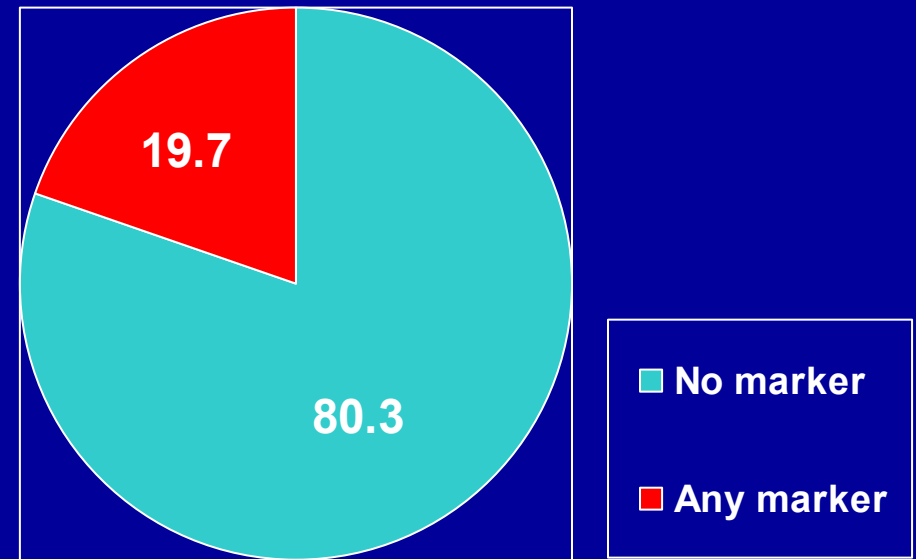
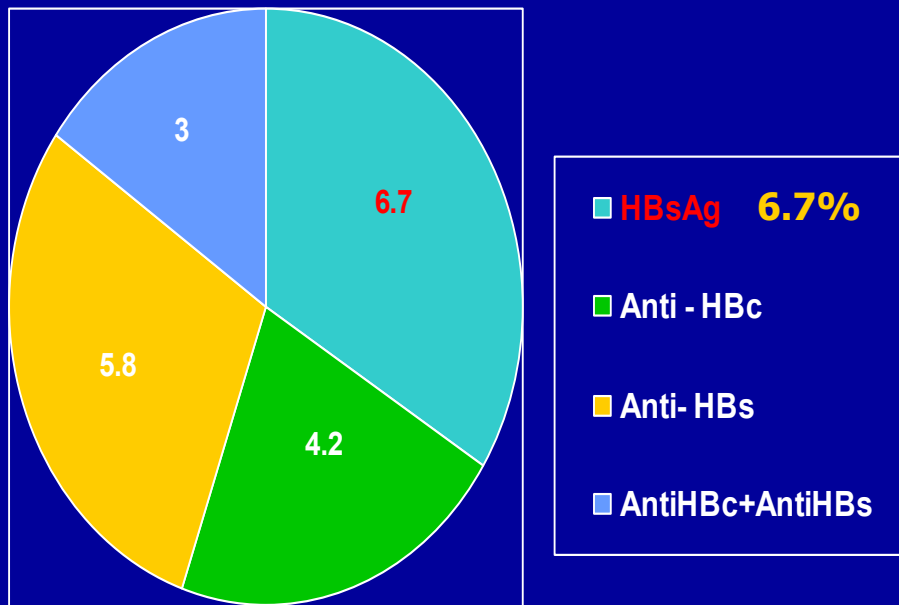
Provinces	no tested	Males		Females	
		% pos	no tested	% pos	no tested
Central	2155	6.9	4494	4.1	
South west	1593	13.8	5642	3.9	
Eastern	7838	11	462	8.2	

**HBV markers [presence of any marker] in male
blood donors [BD] and pregnant females [PF] in
the 1980's**

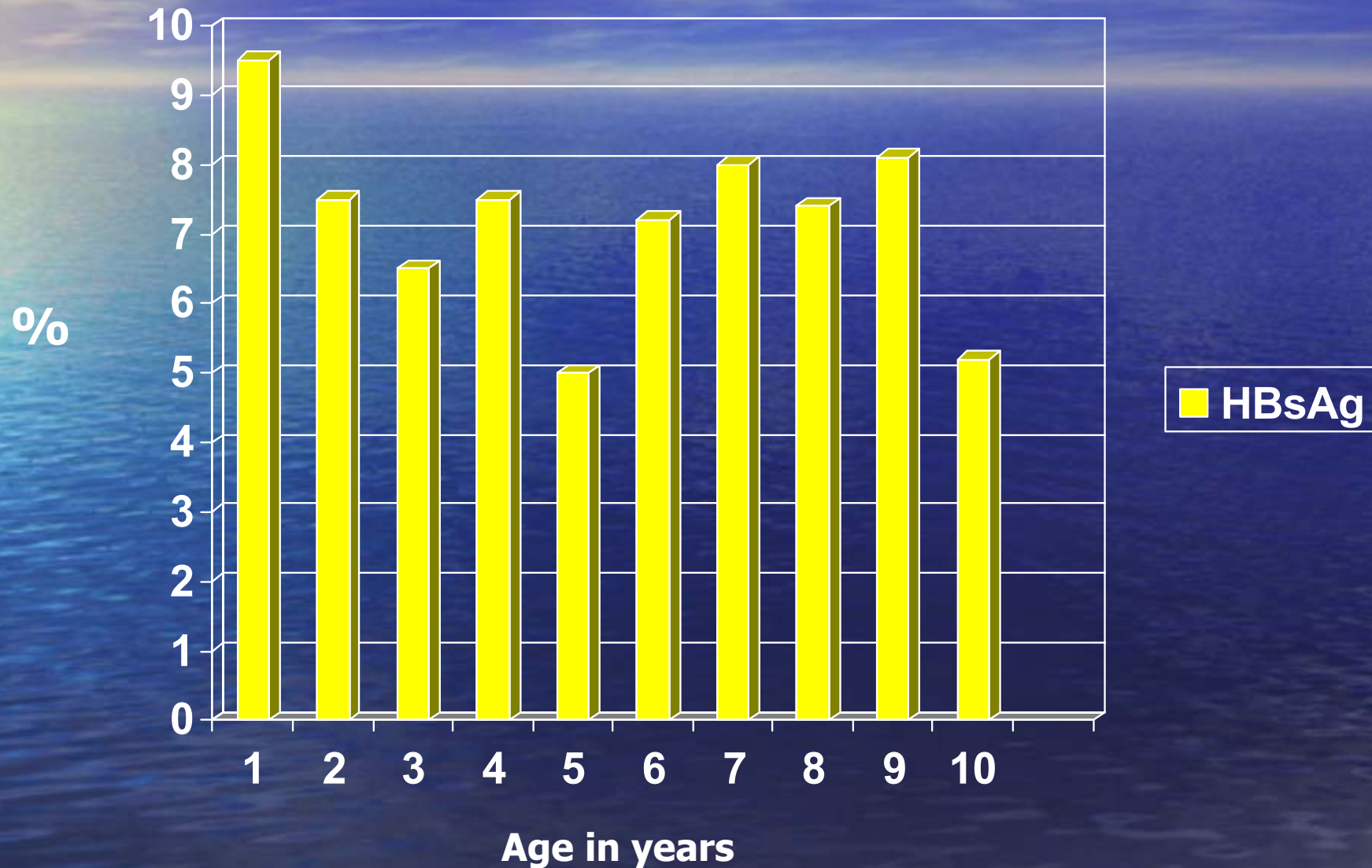


Base – line; community – based survey in Saudi children [1989]

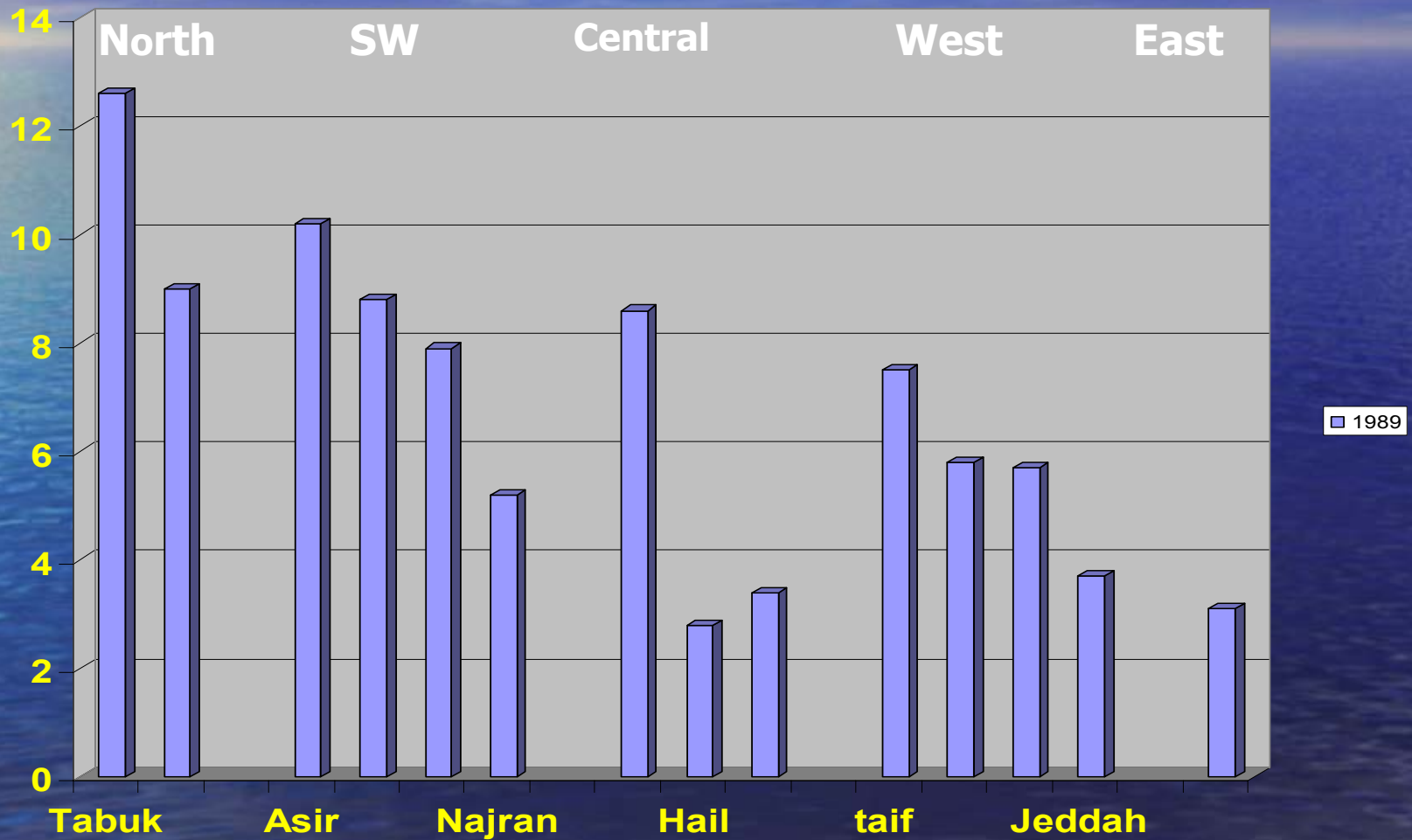
Cluster sampling of 4575 children [2458 males and 2117 females; age < 10y]
Urban (n = 2225) and Rural (n = 2350)



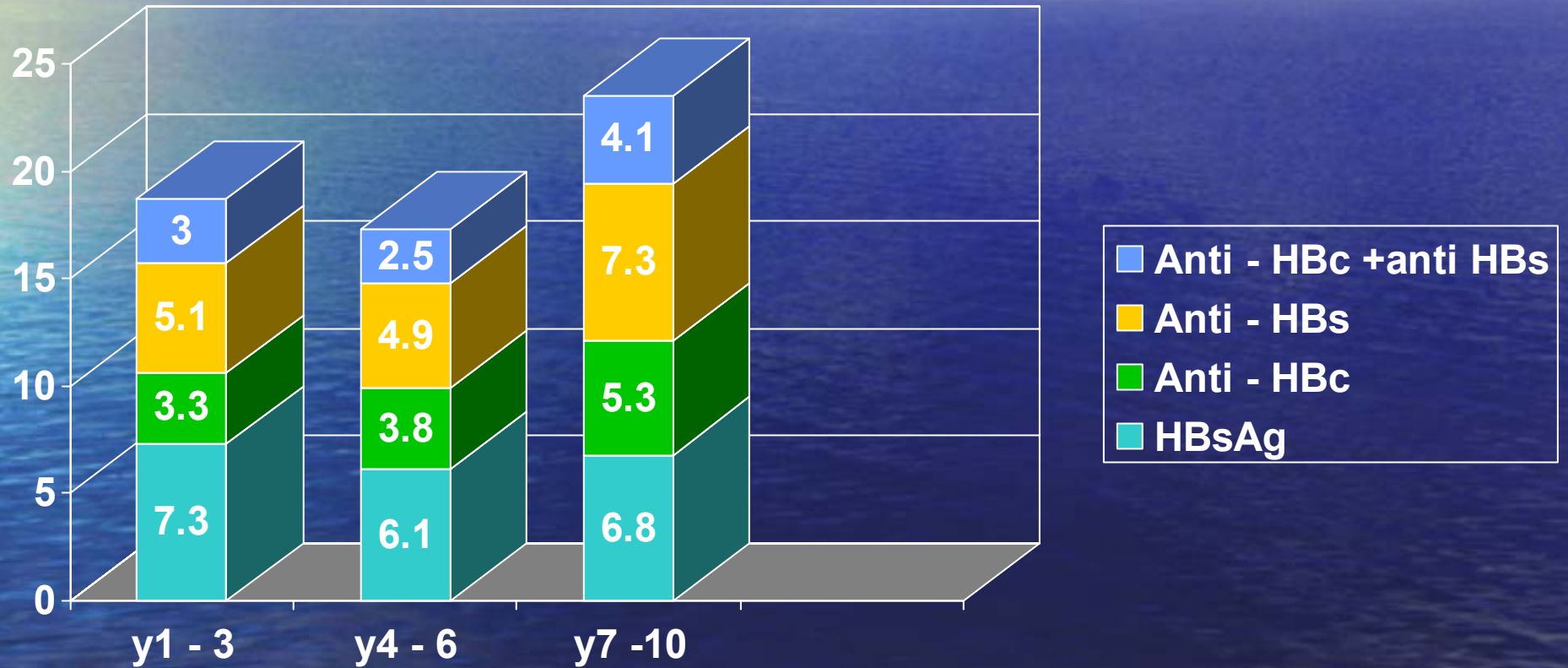
HBsAg in Saudi children in 1989



Regional variation in the prevalence of HBsAg among Saudi children [1989]:



Profile of HBV markers in Saudi children [1989 survey]



HBsAg in Saudi children [1989]

❖ Socio – economic class

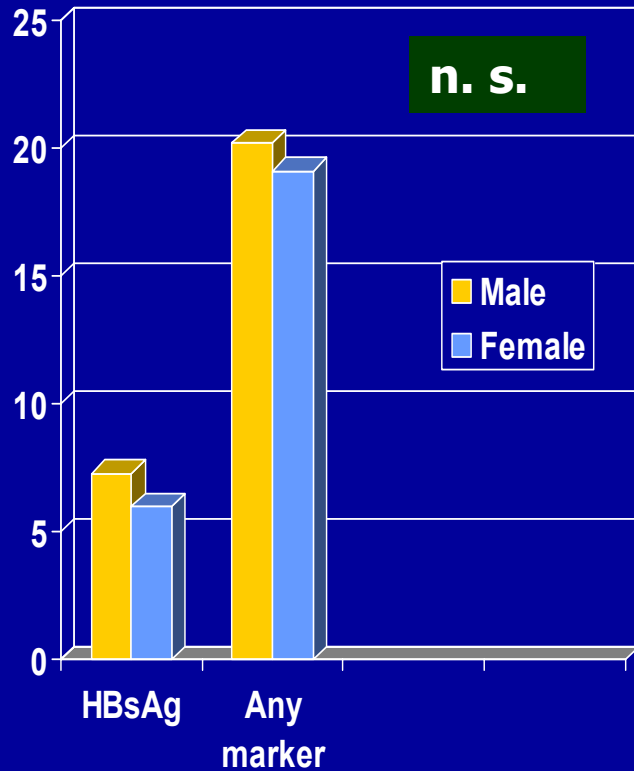
❖ Upper	[80 of 1071]	7.5%
❖ Middle	[92 of 1541]	6.0%
❖ Lower	[133 of 1911]	7.0%

❖ Family size

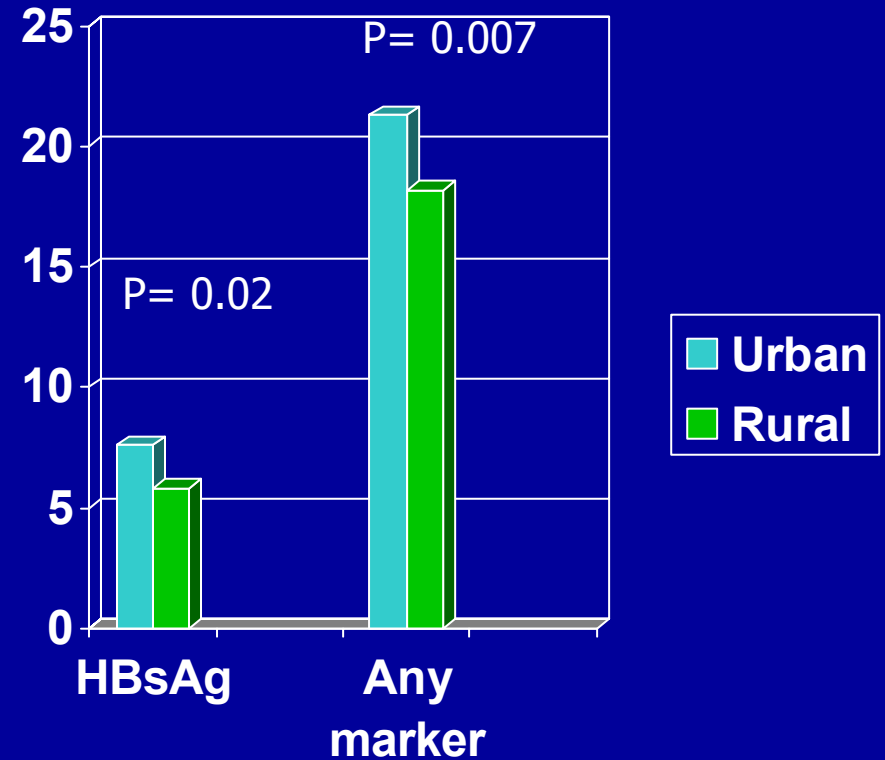
❖ Small [1 -5]	[n = 2102]	6.0%
❖ Medium [6 -10]	[n = 1983]	7.2%
❖ Large [>10]	[n = 292]	8.2%

HBV profile in Saudi children [1989]

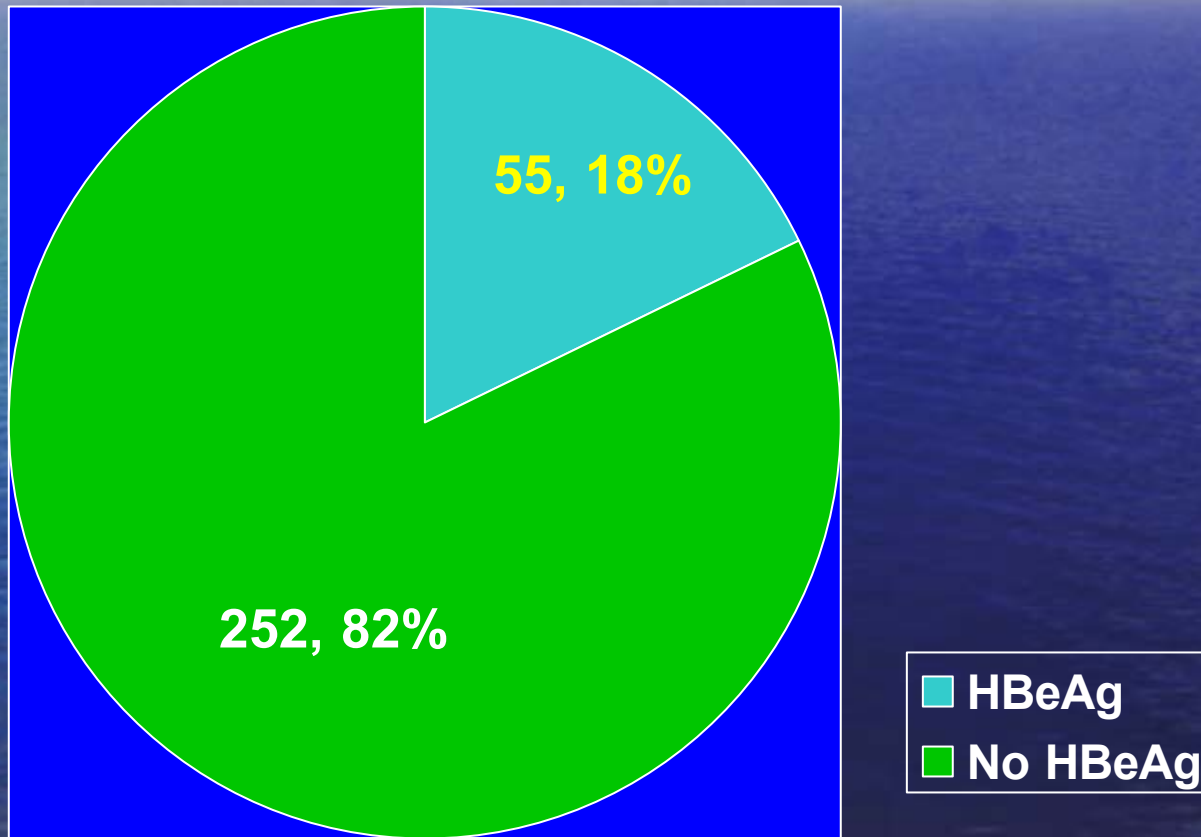
Gender



Residency



HBeAg in HBsAg - positive Saudi children : The status in 1989



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- Overview of the epidemiology of HBV in Saudi Arabia
- **Hepatitis B vaccination: Integration into EPI and initial evaluation**
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- Current role of HBV in liver diseases in Gizan
- Conclusions and thoughts

In 1989, HB vaccine was integrated into the EPI [as the 7th immunogen]

The goal of the program

was to reduce the prevalence of chronic HBV infection,
thereby reducing the reservoir of HBV
and cause a decline in the incidence and prevalence of HBV – related diseases

- **Mandatory**
 - All newborns [0 -1y] 1989
 - Children at school entry[6 -7y] 1990
- **Voluntary**
 - “Pre –schoolers” [1 -5] 1990/1991
 - Health personnel [adults] 1990
 - Others 1989

All Saudi citizens < 18y should have been vaccinated by the year 2002

Evaluation of Hepatitis B vaccination program 2 years after the commencement of the program:

- **Coverage**

- In the first year [1st dose 90%; 3rd dose 73%]
- In the second year [1st dose 95%; 3rd dose 90%]

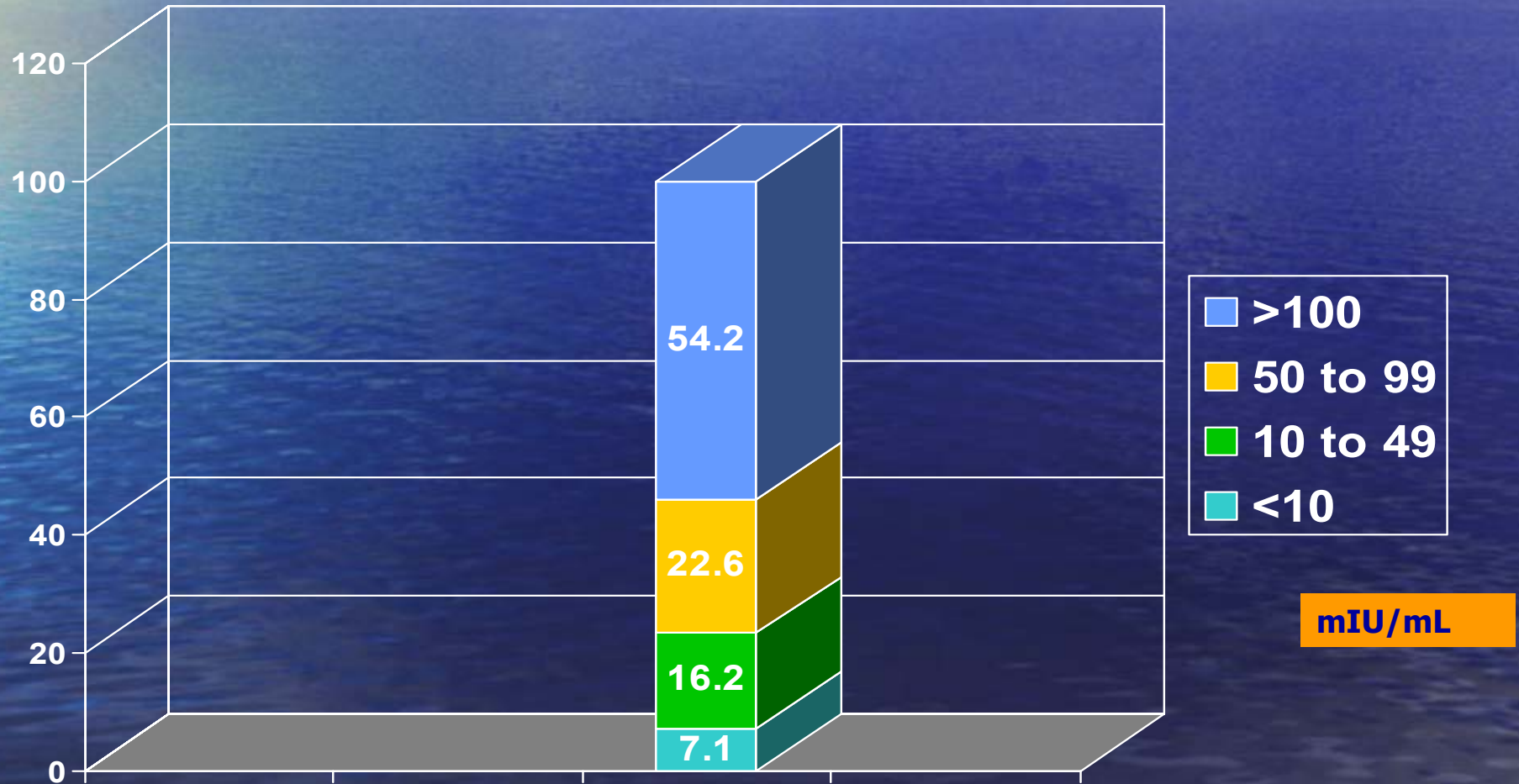
- **Sero -conversion study:**

- 637 vaccinated children [aged 1 and 2 y] compared with
- 617 unvaccinated children [similar age group]
- from 5 regions of different HBV endemicity
- **High** [Tabouk, Gizan] **Medium** [Riyadh] **Low** [Hail, Gassim]

Response to Hepatitis B vaccination in Saudi infants

Regions	No. pos/tested	% anti- HBs positive
Gizan	57/64	89%
Tabouk	103/106	97%
Hail	118/120	98%
Riyadh	187/200	94%
Qassim	138/147	93%

Anti HBs in children vaccinated against HBV



Comparison of the HBV profile between vaccinated and unvaccinated children

	Vaccinated	Unvaccinated
No tested	637	617
Anti HBs +	94%	5.3%
HBsAg +	0%	8.3%
Anti HBc +	0.02%	3.1%
Anti – HBs & anti HBc	0%	2.1%

**Efficacy
99.1%**

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In 1997 a national survey was repeated

..... to determine whether the prevalence of HBV had declined among Saudi children, 8 years after the integration of HB vaccine into the national EPI

No of children = 5355

Prevalence of HBsAg..... 8 years after



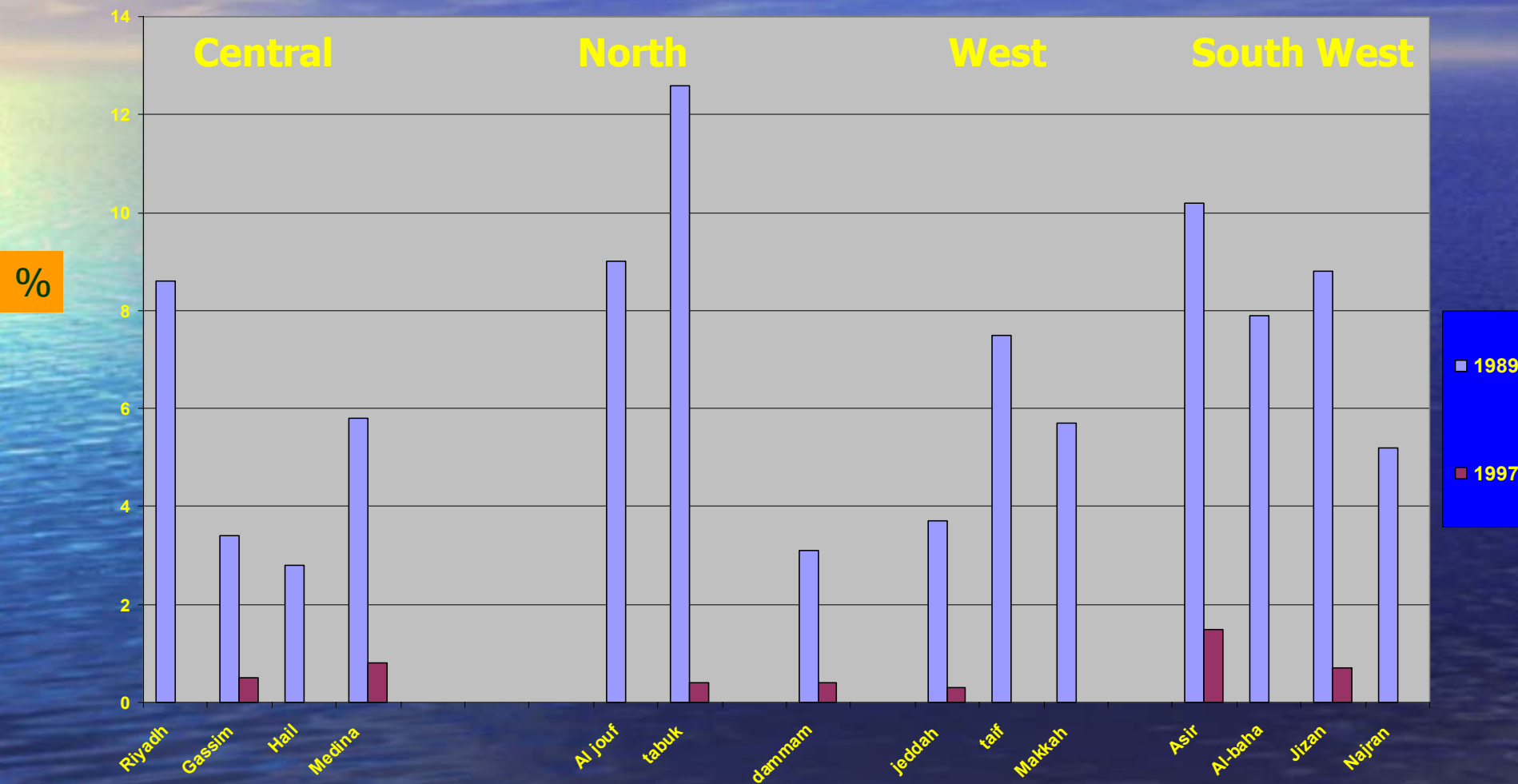
HBsAg prevalence in Saudi children
declined in all areas of the country

1989

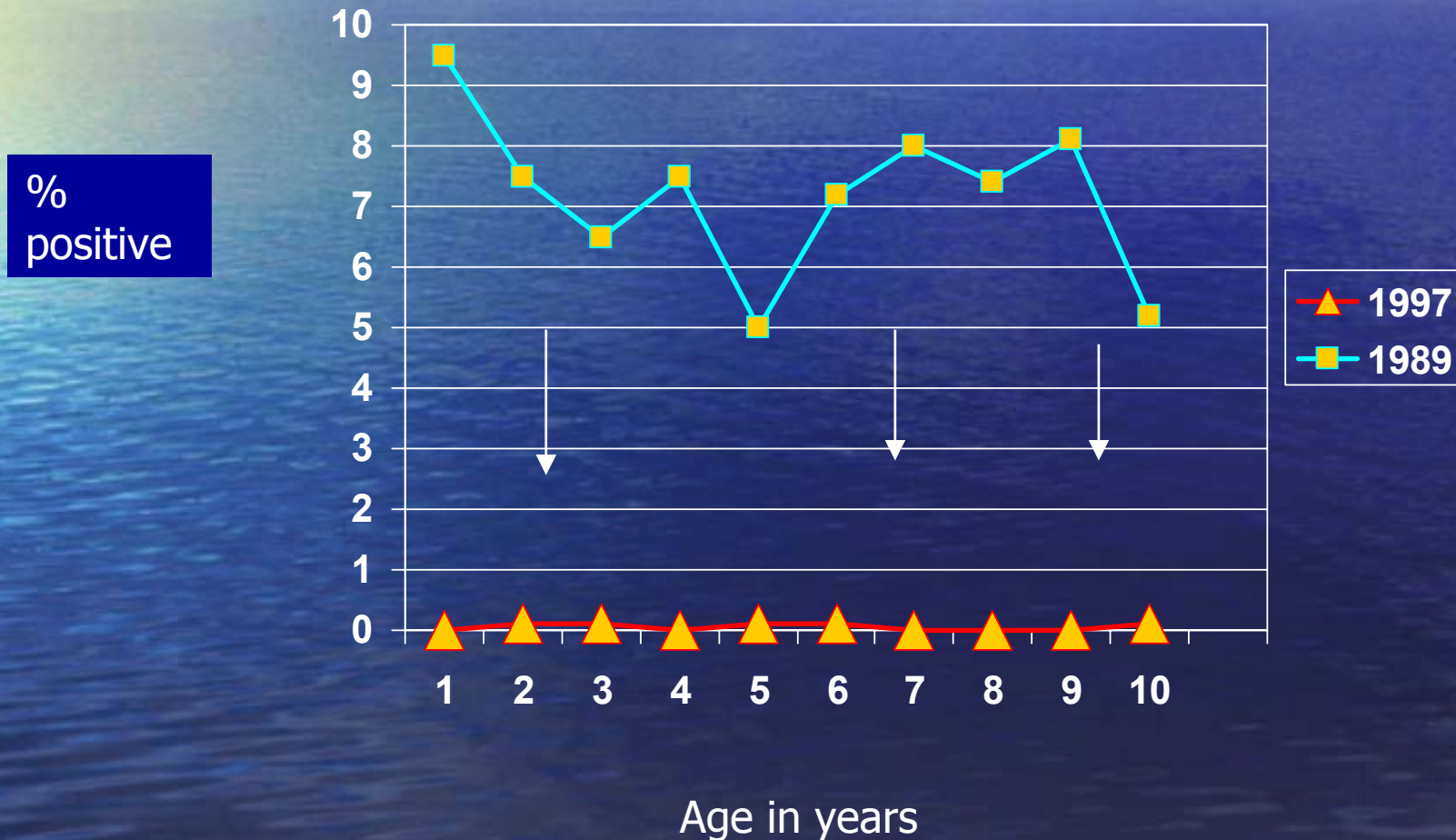
1997

Riyadh	8.6	0
Gassim	3.4	0.5
Hail	2.8	0
Medina	5.8	0.8
Mekkah	5.7	0
Asir	10.2	1.5
Al-baha	7.9	0
Jizan	8.8	0.7
Najran	5.2	0
Al jouf	9	0
tabuk	12.6	0.4
dammam	3.1	0.4
jeddah	3.7	0.3
taif	7.5	0

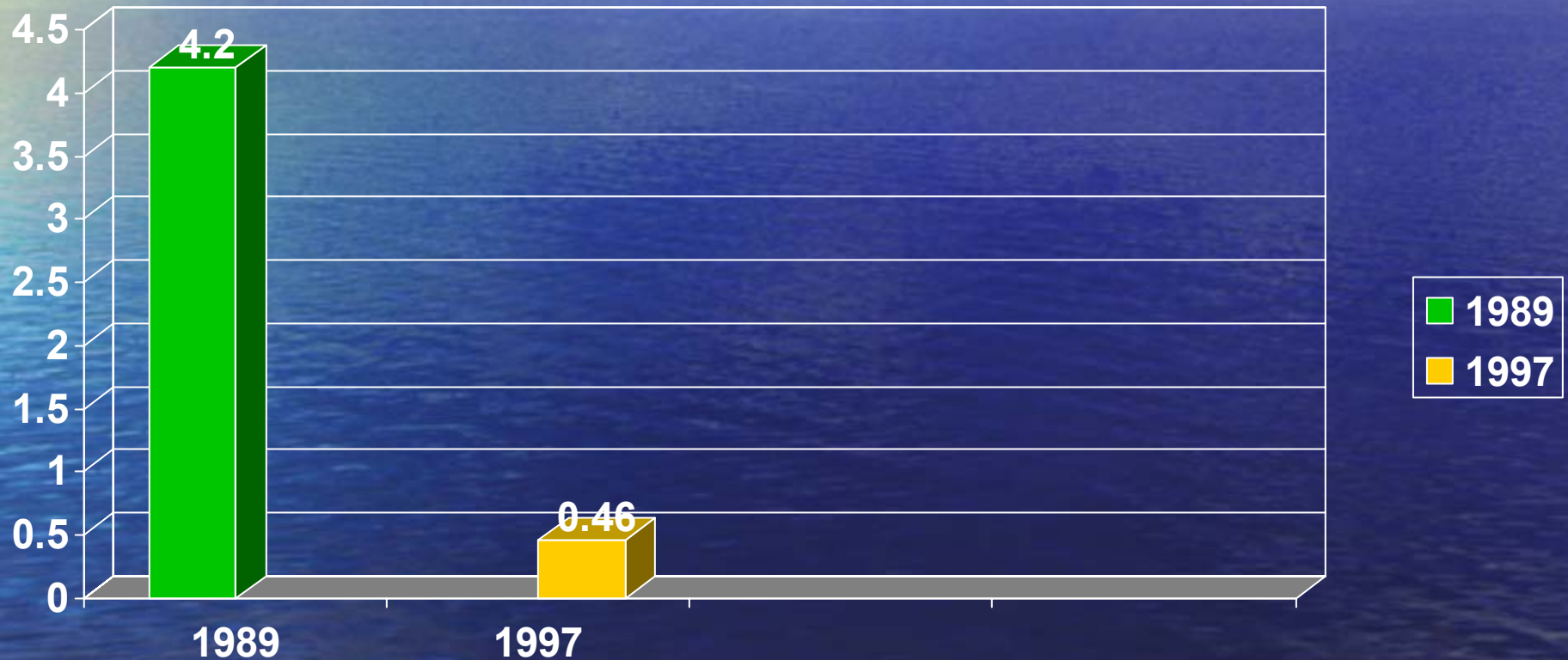
Decline in the prevalence of HBsAg in Saudi children in different regions



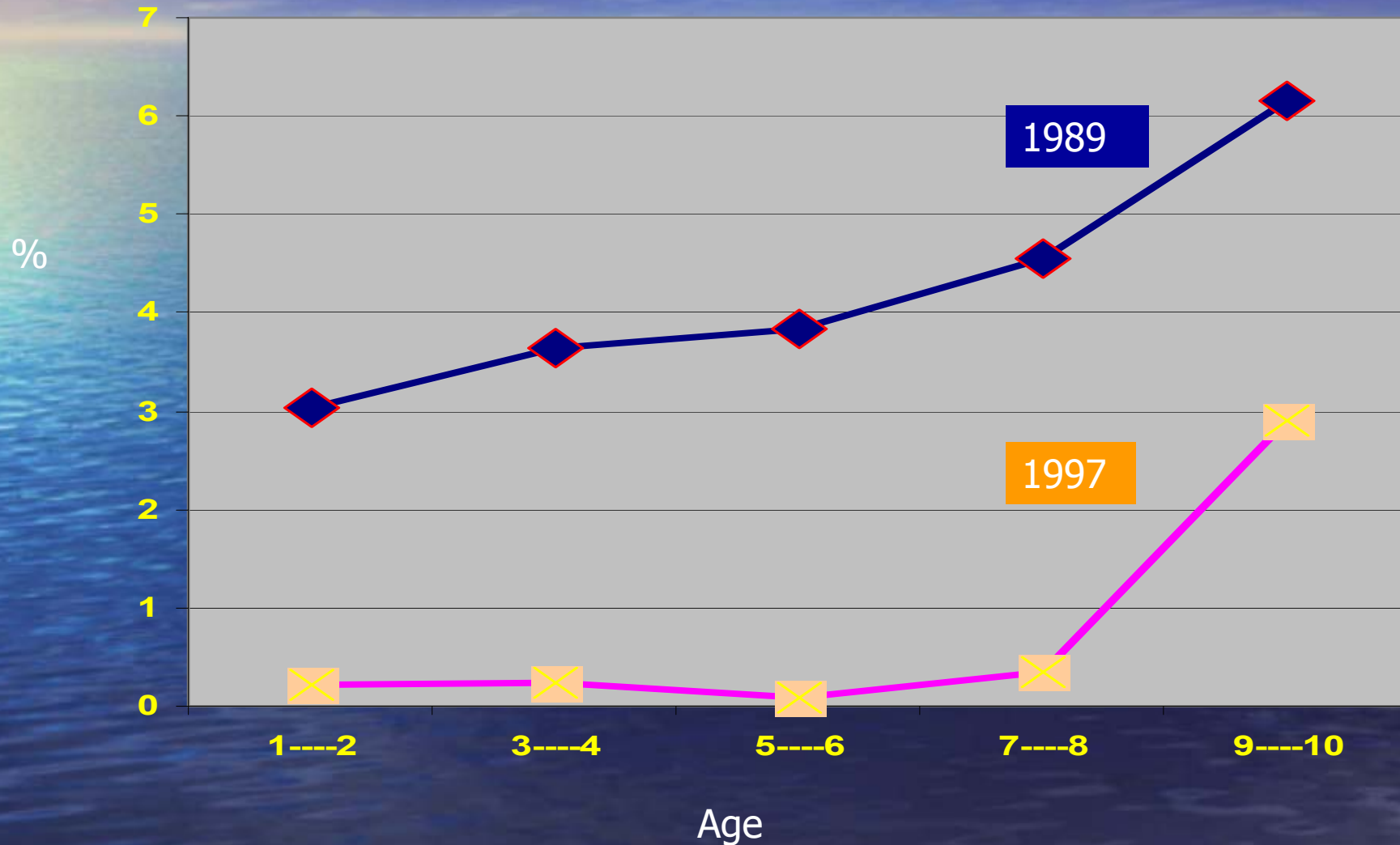
Age – related prevalence of HBsAg: 1989 vs. 1997



Decline of anti- HBc among children 8 years after vaccination program



Decreased prevalence of anti – HBc in children



What about the other viruses?

- HAV
- HCV

The decline of HBsAg among children in the South - Western region: 8 years after commencement of HB Vaccination program

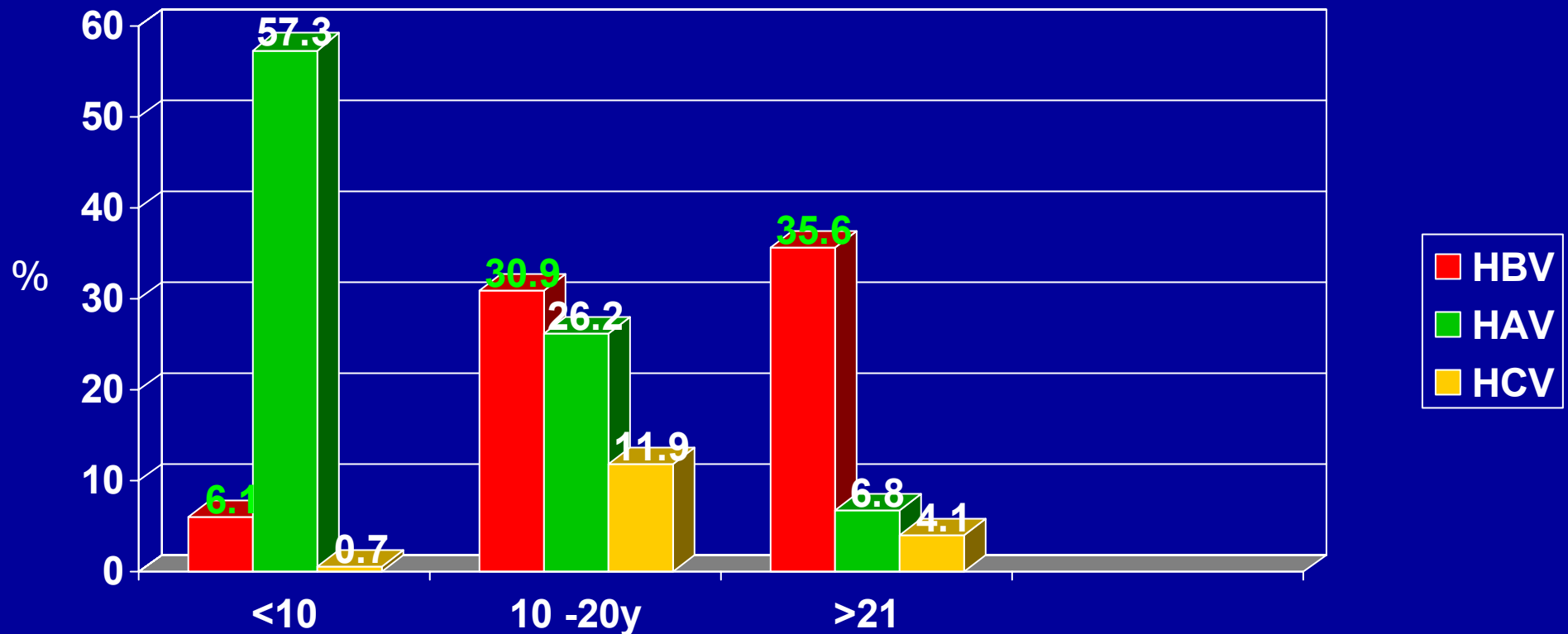
C/f HCV
and HAV

	HBsAg		Anti - HCV		Anti - HAV	
	1989	1997	1989	1997	1989	1997
Asir	10.2	1.5	0.4	0	44.5	19
Al-baha	7.9	0	0.7	0	40.6	22.1
Jizan	8.8	0.7	5.6	0	80	82
Najran	5.2	0	0	0	79.1	50.3

The decline of HBsAg among children in the Central region: 8 years after commencement of HB Vaccination program

	HBsAg		Anti - HCV		Anti - HAV	
	1989	1997	1989	1997	1989	1997
Riyadh	8.6	0	0.8	0.1	39	16
Gassim	3.4	0.5	0	0	62.7	31.6
Hail	2.8	0	0	0	56	20.4
Medina	5.8	0.8	0	0	59.5	28.2

HBV as a cause of acute hepatitis in children and adults 10 years after universal vaccination [1999]



N = 131

N = 42

N = 73

Successful Integration of HB vaccine into the National EPI

- Strong national policy
- Funds and funding
- Effective EPI system
- “External” monitoring and auditing

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Trend in Saudi adults: Studies in Gizan, South – Western region

The south – western regions, particularly Gizan Had very high prevalence rates of HBV infection

Cross – sectional studies in 1985 and 1986..... 12% to 32% in “healthy” persons were HBsAg positive.

In 1992 and 1997 we conducted community – based studies with larger number of subjects

HBV and HCV in Gizan, Saudi Arabia [1992]

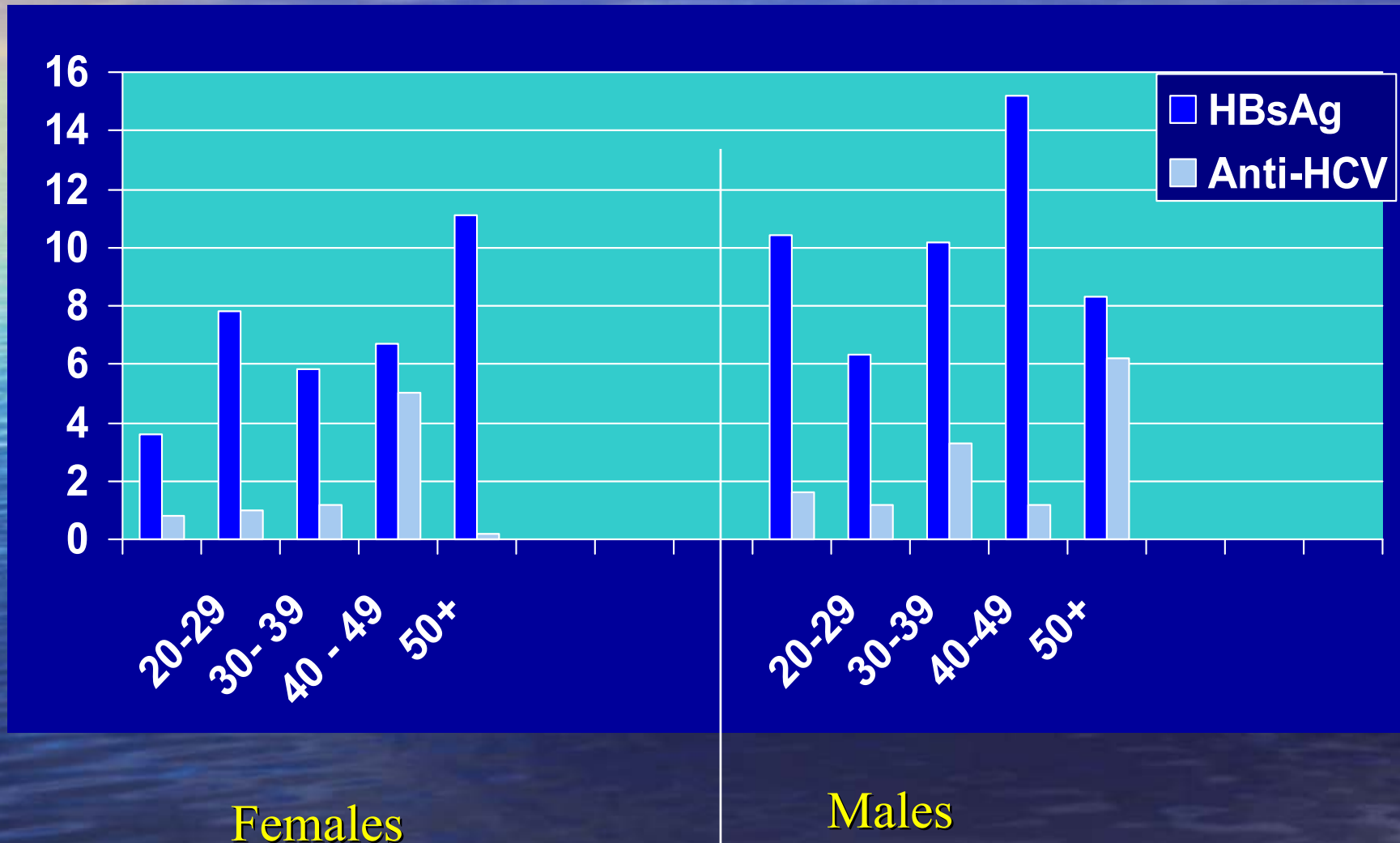
Anti - HCV

- Males ... 2.3 %
[n=705]
- Females 1.4 %
[n=777]
- All..... 1.8 %
[n=1482]

HBsAg

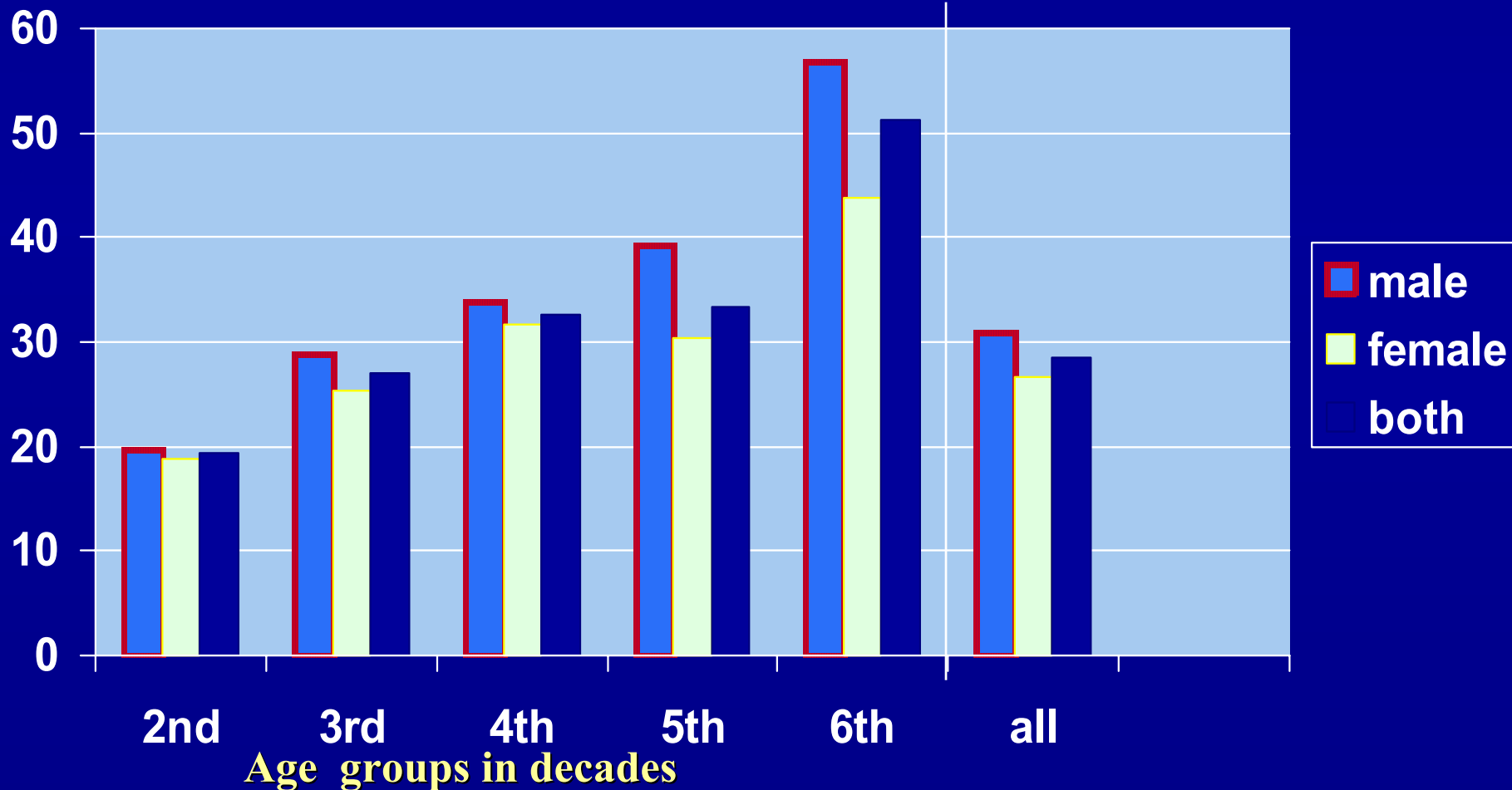
- Males 9 .4%
[n=371]
- Females ... 6 .1%
[n=424]
- All 7 .7%
[n=795]

Prevalence of HBsAg and anti-HCV among adult populations of the Gizan region of Saudi Arabia [1992]



Prevalence of HBV [any marker] in South - Western Region of Saudi Arabia [1992]

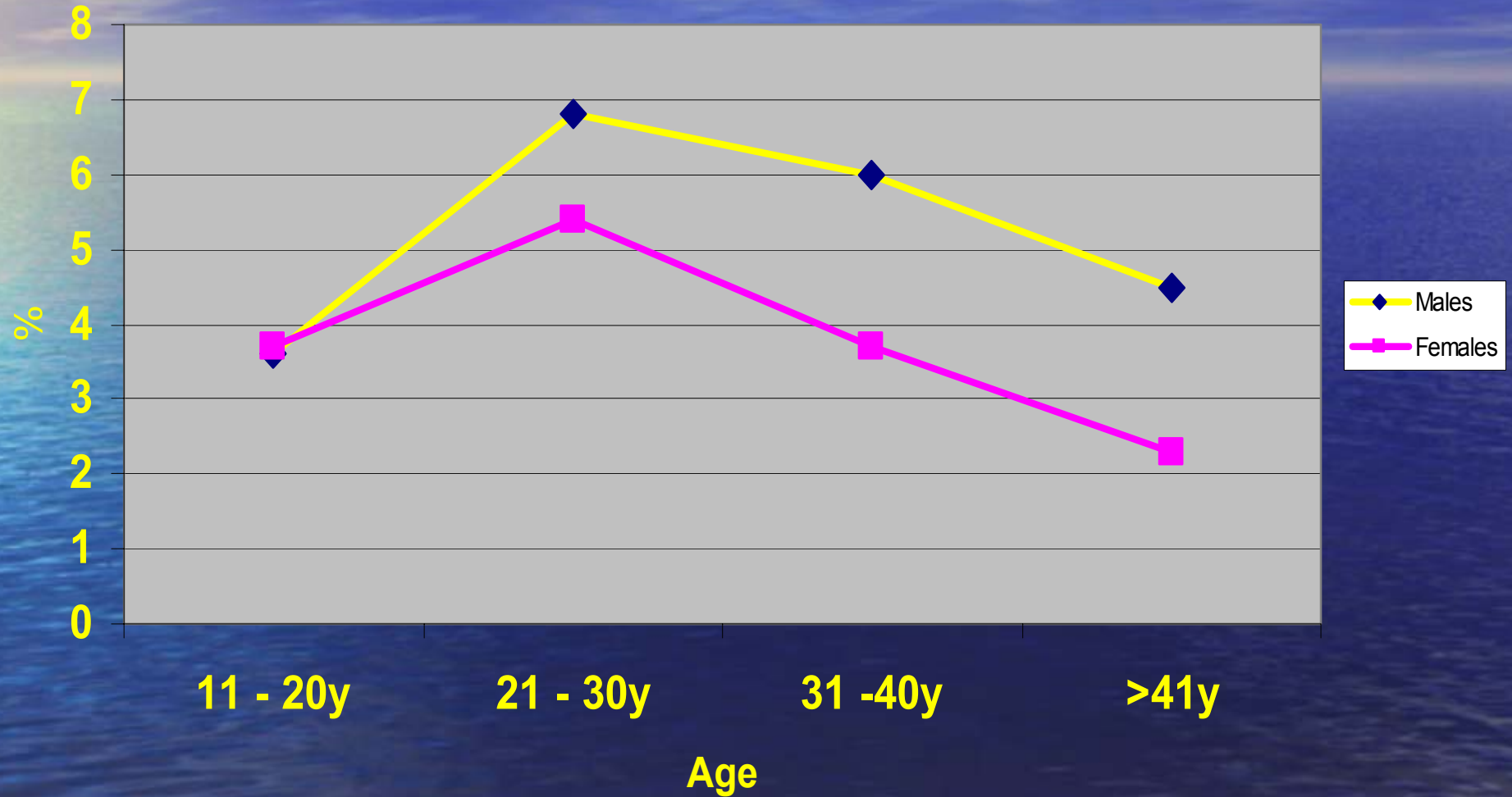
% any marker



Further studies in Gizan 1995 to 1998

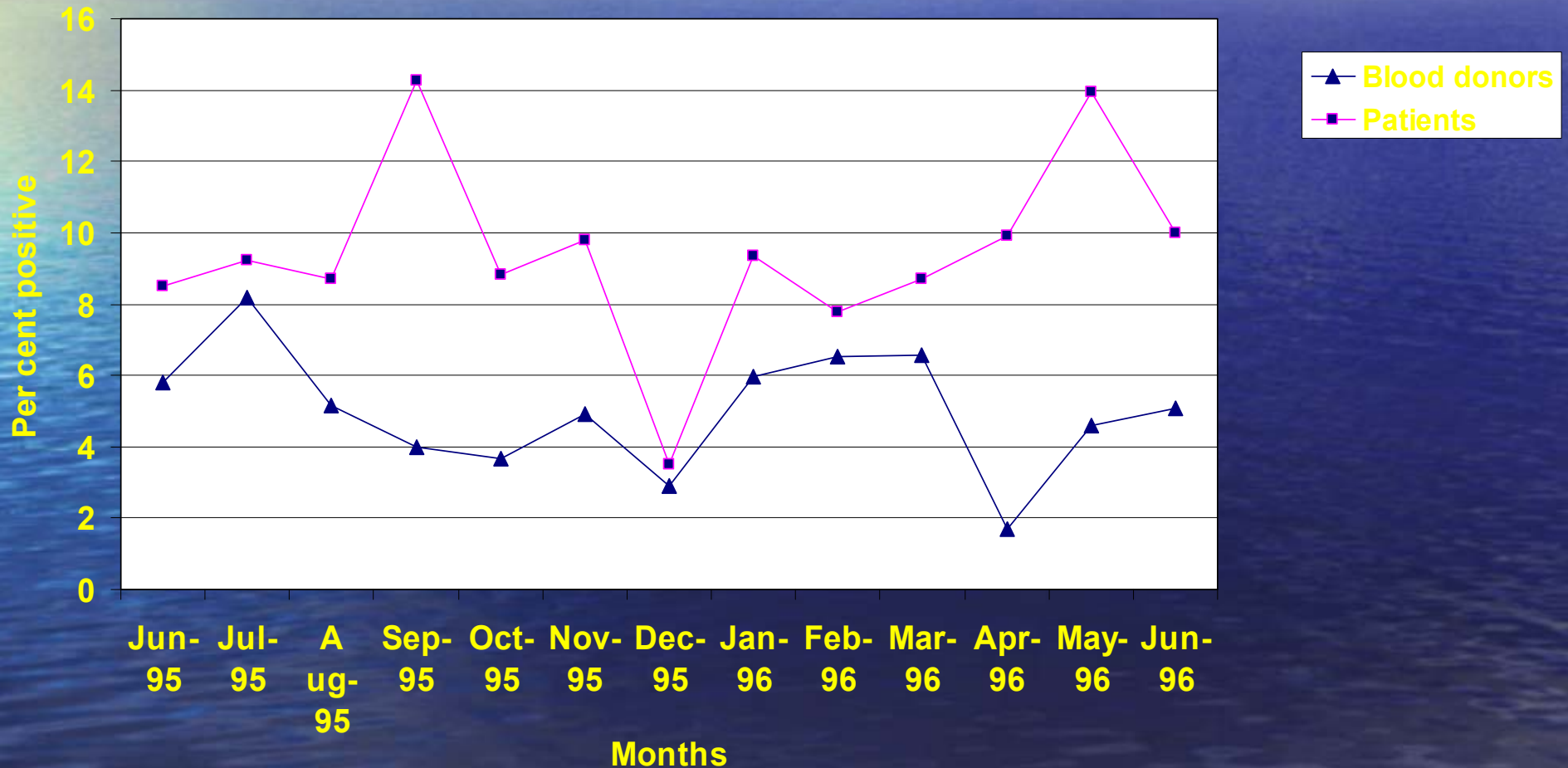
- Blood donors [14883 males] tested June 1995 to June 1997
 - **HBsAg 5.4%**
- Subjects [males and females] from community [n = 1172] in 1997
 - **HBsAg = 5.1%**
- Hospitalized patients [n = 4692] from June 1995 to June 1996
 - **HBsAg = 9.4%**
- Children [<10y; n = 229] in 1997/98
 - **HBsAg = 0.9% [2 children]**

HBsAg in Gizan adults [1997]



Prevalence of HBsAg in the Gizan region of Saudi Arabia:

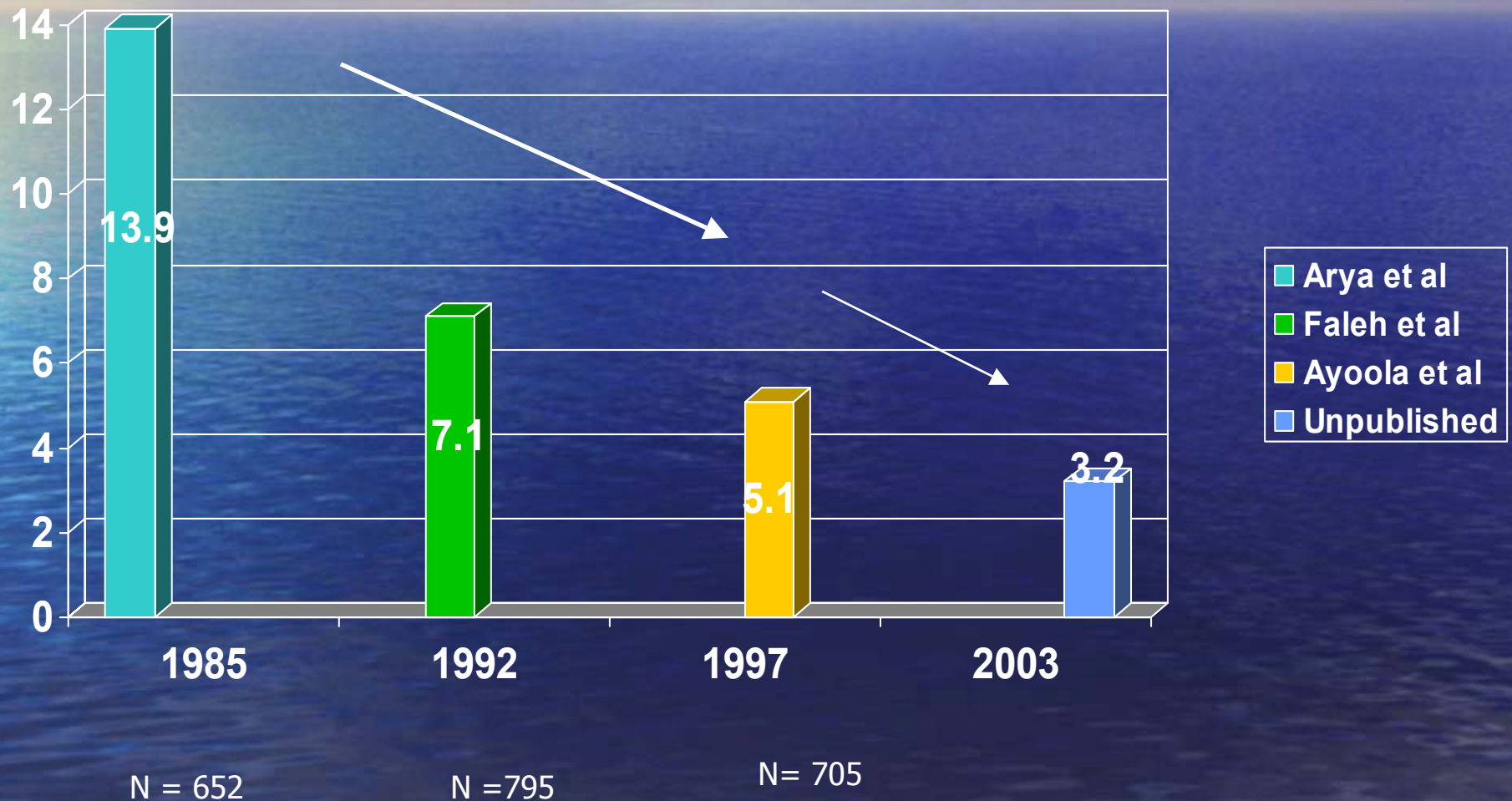
Analysis of blood donors [n=6927] and patients [n = 4692]



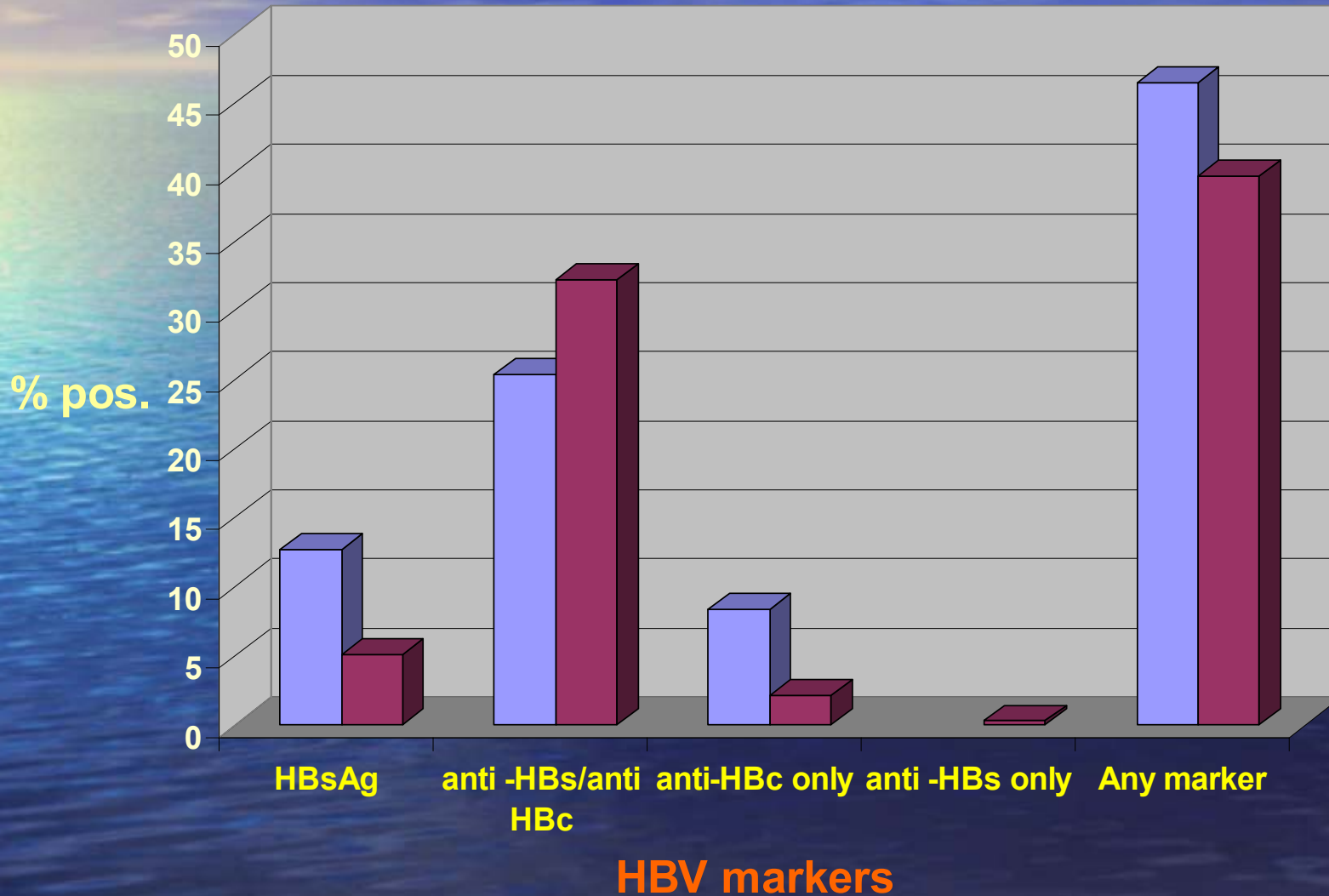
The decline of HBV in the apparently healthy population of Gizan

	1985 [Arya]	1992[Faleh]	1997 [Ayoola]
Males	57/286 [19.9%]	35/371 [9.4%]	23/398 [5.8%]
Females	34/366 [9.3%]	26/424 [6.1%]	13/306 [4.2%]
All	91/652 [13.9%]	61/795 [7.7%]	36/704 [5.1%]

Trend in the prevalence of HBsAg in asymptomatic Saudi adults in Gizan

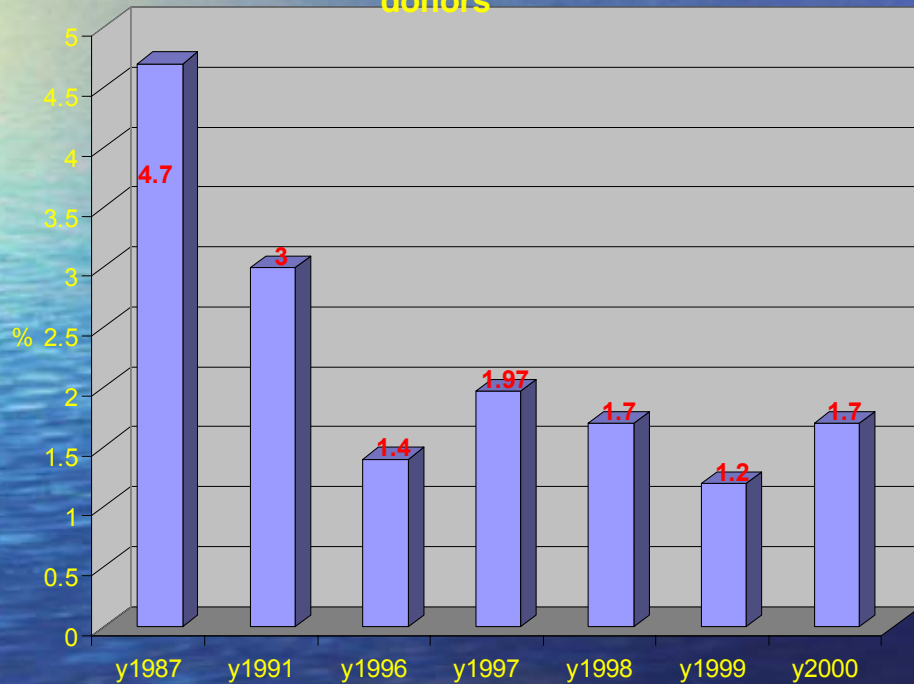


HBV markers in Gizan, Saudi Arabia: Comparison of rates in adults [1985 and 1997]



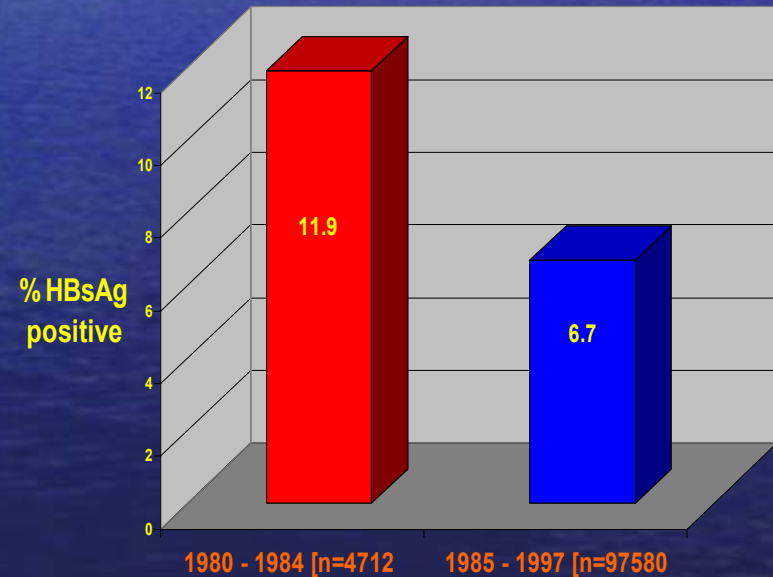
Similar trend in other regions

Central region: HBsAg in Riyadh blood donors



Faleh et al 2004

Decline of HBsAg prevalence in the Eastern Region of Saudi Arabia



Fathala et al

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HBV and liver diseases

The ultimate goal of preventive intervention is to reduce the incidence and prevalence of

Chronic carriage of HBV

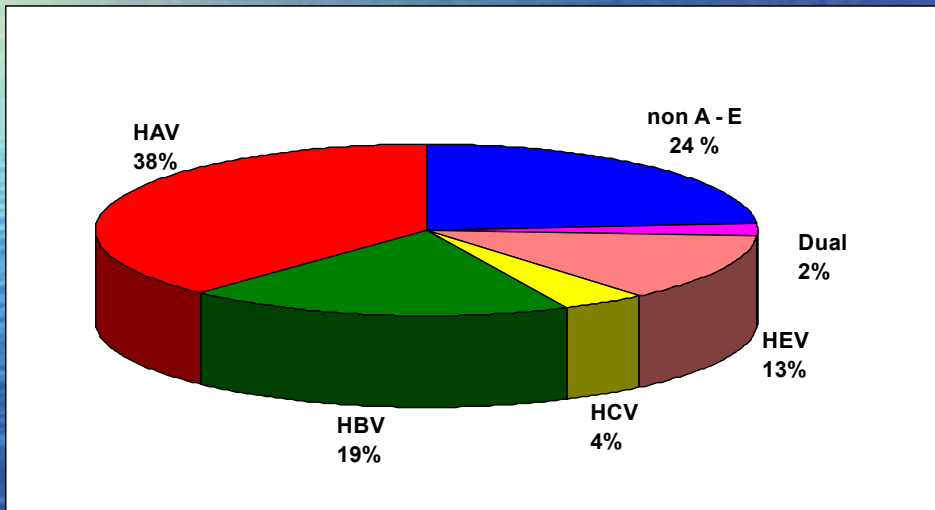
Acute hepatitis

Chronic hepatitis and Liver cirrhosis

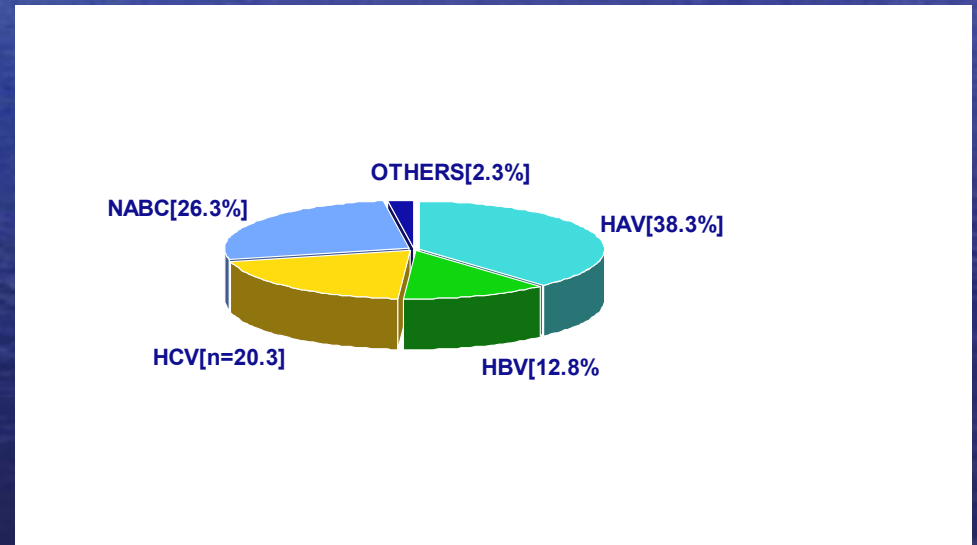
Hepatocellular carcinoma

Etiology of Viral Hepatitis

in Gizan



In Riyadh



The role of HBV and HCV in hepatocellular carcinoma [HCC] in Saudi Arabia

Case – control study 1997 -1998

Ayoola et al JGH 2004

50% improvement in health indicators in a community can be attributed to EDUCATION [WHO]

- Literacy rates in Saudi population
 - 1950 -60 < 20%
 - 1970 : 40 -50%
 - 1990: 80 -90%
- Socio – economic progress
 - Housing
 - Sanitation
 - Awareness

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Hepatitis B vaccination exerted the greatest impact on HBV infection in Saudi Arabia

Summary and conclusions

- HBV was endemic in Saudi Arabia
- Major reduction in HBV infection and its transmission has occurred as a result of the universal HB vaccination
- A secondary effect of HB vaccination most likely, contributed to the decline of the HBV prevalence observed among largely unvaccinated adult population
- Do we need booster dose?
 - Preliminary analysis of children [14 – 15 y] and [19 – 20y]



Thank you