

USING BLOOD DONOR SCREENING TO MONITOR PREVALENCE OF HIV AND HEPATITIS B AND C VIRUSES, SOUTH AFRICA

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Background

- South Africa has one of the largest HIV epidemics in the world
 - HIV prevalence in 15-49 years old – 18,8%
 - Incidence in sexually active males and females – 1,21 and 2,28 per 100 person years
- Chronic HBV prevalence of 4%
- SANBS collects blood in 8 of the 9 provinces nationally
- SANBS screens all donations for HIV, HBV & HCV using ID-NAT in parallel with serology testing

METHODS

- All eligible first time blood donors at SANBS from January 2012 to September 2015 were included
- Blood drive codes were mapped to province
- Deferred donors were excluded
- Blood donations were simultaneously screened for HIV RNA, HCV RNA and HBV DNA using the Ultrio Plus (Elite) ID-NAT from Grifols and anti-HIV, anti-HCV and HBsAg using the Abbott Prism ChLia
- Confirmatory HIV western Blots, HCV InnoLia and HBsAg neutralization was performed on NAT negative, Prism repeat reactive donations

METHODS

- Prevalence in first-time donors was calculated as number positive / number tested.
- To assess independent associations with seropositivity, odds ratios and 95% Confidence intervals were derived using multivariable logistic regression
- Males and Females were assessed separately due to significant interactions between Sex and Age and Sex and Race

PREVALENCE BY AGE AND SEX

Characteristic	No. (%) first-	No. (%)		
	time donors	HIV-positive	HBV-positive	HCV-positive
Overall	397,640 (13)	4,481 (1.13)	2,638 (0.66)	125 (0.03)
Age group, y				
<20	185,983	1,139 (0.61)	382 (0.21)	6 (0.00)
20–29	103,373	1,702 (1.65)	999 (0.97)	39 (0.04)
30–39	55,420	1,038 (1.87)	721 (1.30)	17 (0.03)
40–49	33,330	440 (1.32)	366 (1.10)	21 (0.06)
50–59	16,518	146 (0.88)	151 (0.91)	31 (0.19)
≥60	3,016	16 (0.53)	19 (0.63)	11 (0.36)
Sex				
Male	177,729	1,396 (0.79)	1,635 (0.92)	77 (0.04)
Female	219,903	3,085 (1.40)	1,003 (0.46)	48 (0.02)

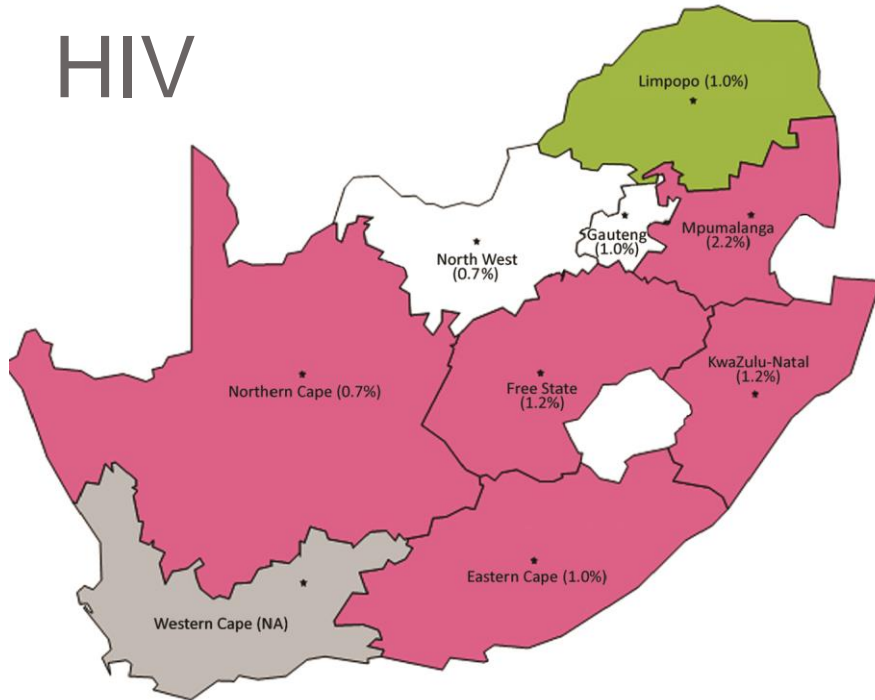
PREVALENCE BY RACE AND PROVINCE

Characteristic	No. first-time donors	No. (%)		
		HIV-positive	HBV-positive	HCV-positive
Race/ethnicity				
Black	211,722	4,204 (1.99)	2,355 (1.11)	62 (0.03)
White	122,894	74 (0.06)	80 (0.07)	43 (0.03)
Asian	28,428	28 (0.10)	41 (0.14)	11 (0.04)
Coloured	20,246	98 (0.48)	99 (0.49)	5 (0.02)
Unknown	14,350	77 (0.54)	63 (0.44)	4 (0.03)
Province				
Eastern Cape	37,055	365 (0.99)	315 (0.85)	4 (0.01)
Free State	20,759	241 (1.16)	68 (0.33)	3 (0.01)
Gauteng	175,623	1,774 (1.01)	967 (0.55)	77 (0.04)
Kwa-Zulu Natal	80,111	918 (1.15)	728 (0.91)	14 (0.02)
Limpopo	15,661	159 (1.02)	113 (0.72)	7 (0.04)
Mpumalanga	35,720	779 (2.18)	305 (0.85)	8 (0.02)
Northwest	19,205	124 (0.65)	65 (0.34)	7 (0.04)
Northern Cape	10,333	74 (0.72)	57 (0.55)	3 (0.03)

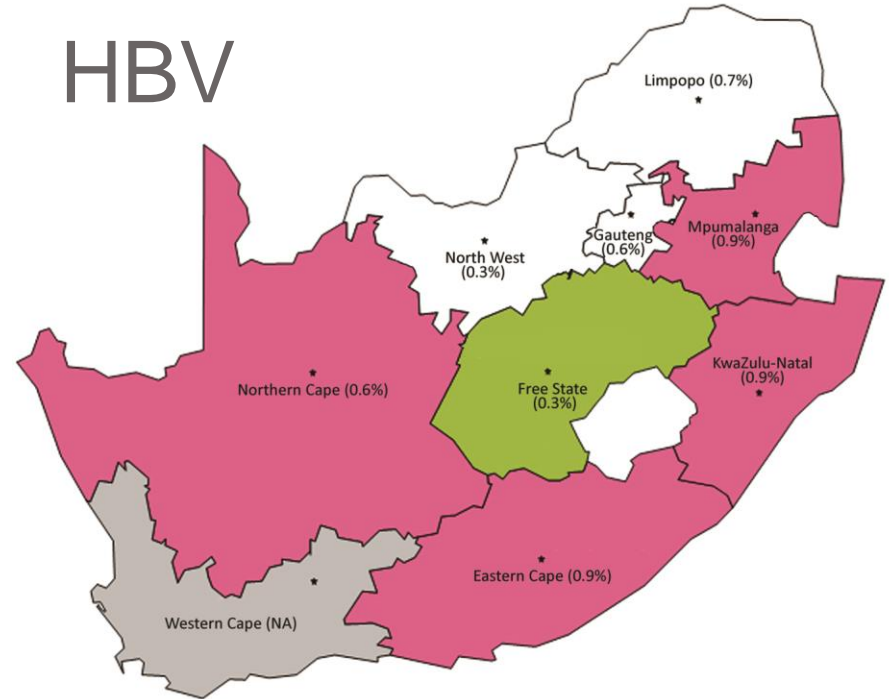
PREVALENCE BY PROVINCE

Odds Ratio compared with Gauteng

HIV



HBV



- Significantly Higher Odds Ratio
- Significantly Lower Odds Ratio
- Not significant
- Not Measured

LOGISTIC REGRESSION MODEL FOR HIV INFECTION IN FEMALES

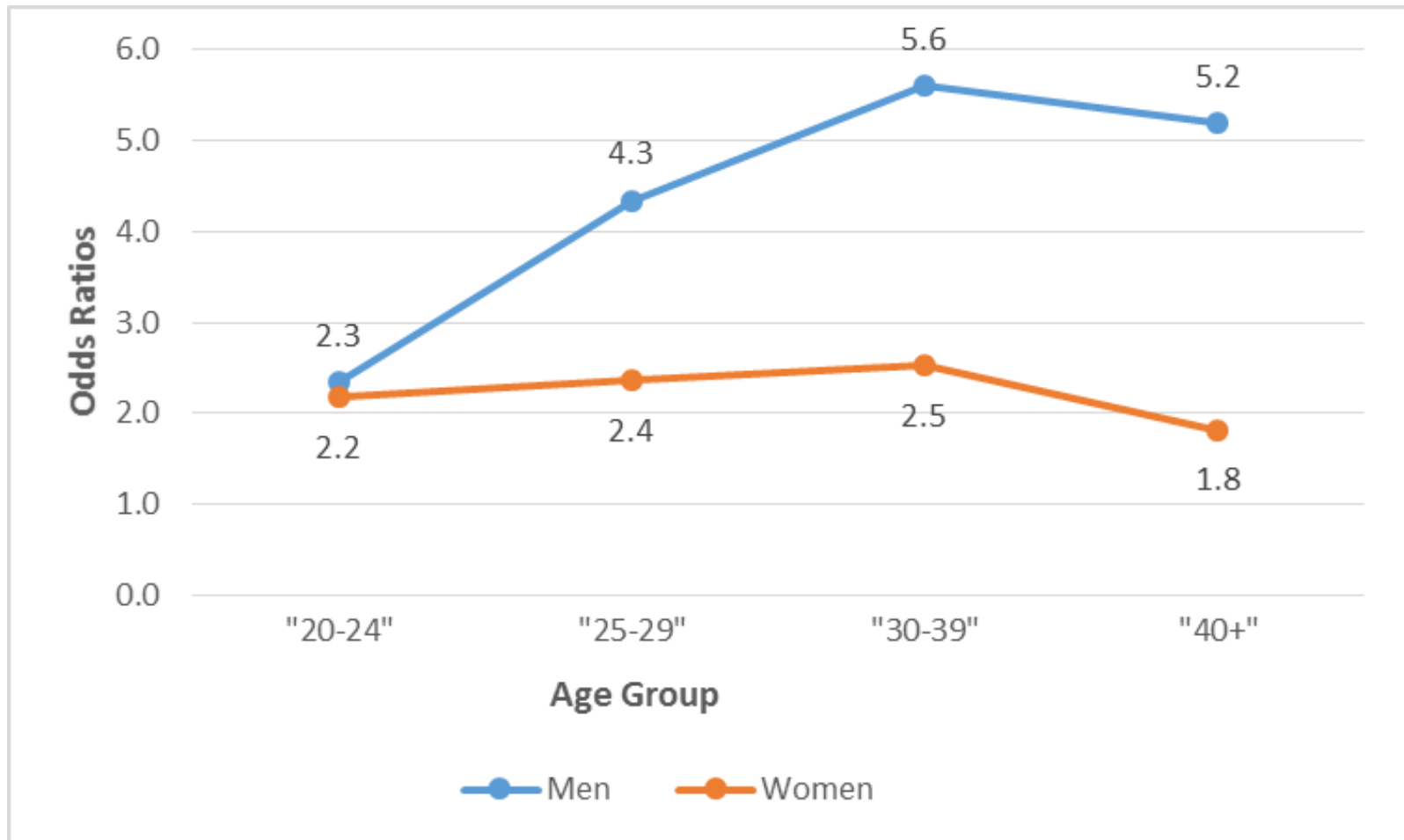
Variable		Odds Ratio	95% Wald Confidence Limits	
Age (vs. <20)	20-24y	2,17	1,96	2,41
	25-29y	2,36	2,11	2,63
	30-39y	2,53	2,28	2,81
	>=40	1,81	1,59	2,07
Race (vs. White)	Asian	1,66	0,89	3,09
	Black	40,29	28,84	56,29
	Coloured	8,86	5,81	13,53
	Unknown	11,19	7,26	17,26
Collection site	Mobile vs Fixed	1,34	1,19	1,52
Coinfection	HBV Positive	2,04	1,54	2,7
	HCV Positive	4,63	1,39	15,41

LOGISTIC REGRESSION MODEL FOR HIV INFECTION IN FEMALES

Variable	Odds Ratio	95% Wald	
		Confidence Limits	
Province (vs. Gauteng) Eastern Cape	1,21	1,06	1,38
Free State	1,38	1,17	1,63
Kwa-Zulu Natal	1,56	1,41	1,72
Limpopo	0,77	0,63	0,95
Mpumalanga	2,44	2,2	2,71
North West	0,98	0,78	1,23
Northern Cape	1,17	0,85	1,61

HIV: Interaction between Age and Sex

.....higher odds ratios in older males

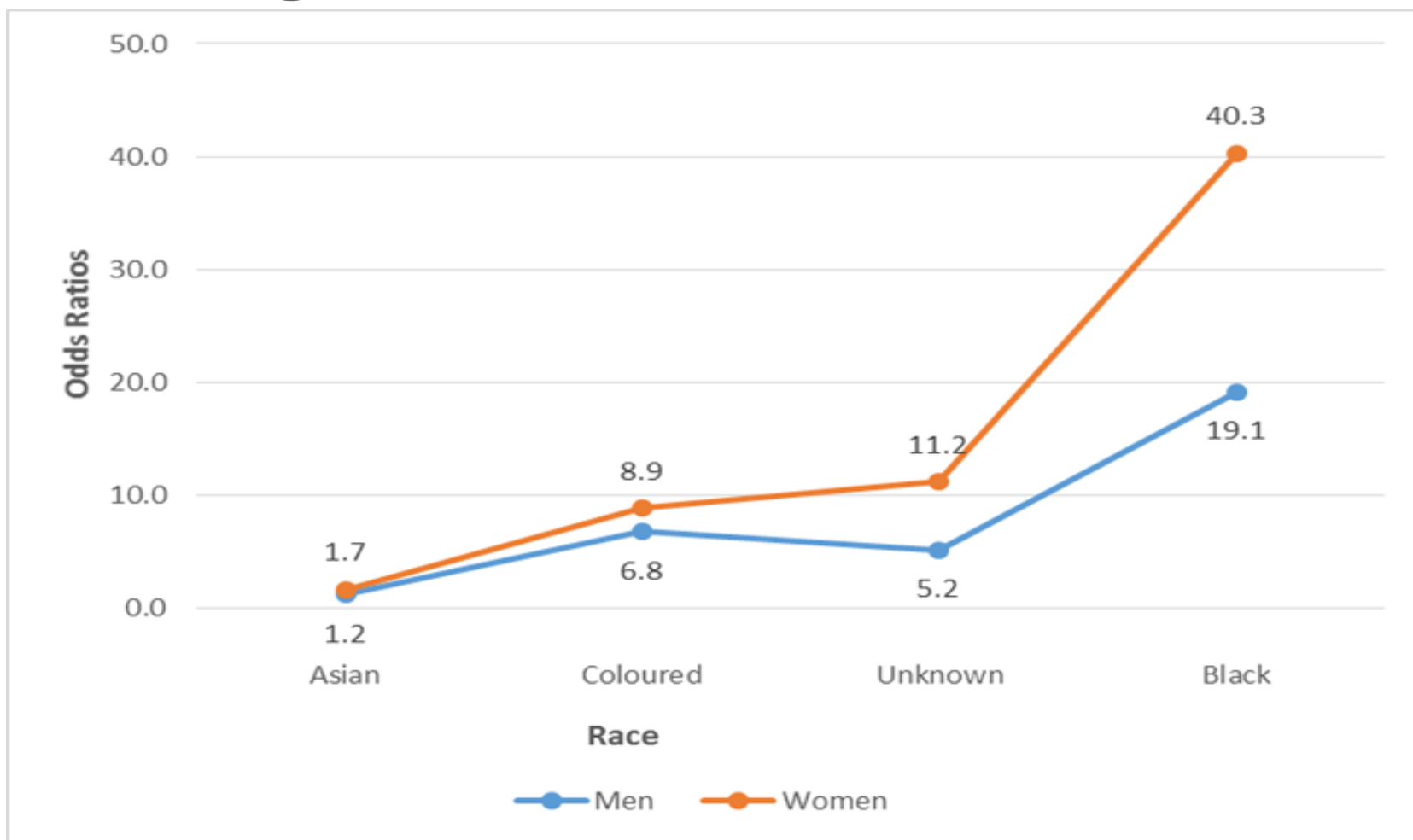


Note: compared with <math><20</math> year olds

All significant

HIV: Interaction between Race and Sex

.....higher odds ratios in Black females



Note: compared with Whites
All significant except Asian

LOGISTIC REGRESSION MODEL FOR HBV INFECTION IN MALES

Variable		Odds Ratio	95% Wald Confidence Limits	
Age (vs. <20)	20-24y	4,19	3,5	5,02
	25-29y	6,02	5,03	7,20
	30-39y	7,94	6,72	9,38
	>=40	7,29	6,1	8,72
Race (vs. White)	Asian	1,52	0,97	2,39
	Black	16,04	12,14	21,19
	Coloured	5,33	3,57	7,96
	Unknown	4,63	3,03	7,09
Coinfection	HIV Positive	2,08	1,61	2,70

LOGISTIC REGRESSION MODEL FOR HBV INFECTION IN MALES

Variable	Odds Ratio	95% Wald Confidence Limits	
Province (vs. Gauteng)			
Eastern Cape	1,77	1,48	2,12
Free State	0,8	0,60	1,08
Kwa-Zulu Natal	2,27	2,00	2,58
Limpopo	1,08	0,85	1,37
Mpumalanga	1,28	1,08	1,51
North West	0,9	0,67	1,21
Northern Cape	1,31	0,91	1,89

CONCLUSIONS: HIV

- Overall HIV prevalence of 1.13% which although high compared to high income countries is 18 fold lower than the South African general adult population
- HIV infection was more strongly associated with older age among male donors compared with female donors and more strongly with black and unknown race/ethnicity among female donors than among male donors
- HIV was associated with donation in Mpumalanga, Kwa-Zulu Natal, and Free State provinces for both sexes, and with Eastern Cape Province for female donors and Northern Cape Province for male donors

CONCLUSIONS: HBV

- An overall HBV prevalence in First time donors of 0.66% was found, five fold lower than the general population
- A prevalence of approximately 1% was found in donors older than 20 years compared to 0.2% for those under 20 years, showing the effect of the vaccination program
- HBV prevalence was twice as high in males than females and higher in those of black and coloured compared to white race and ethnicity.
- HBV infection had a geographic distribution slightly different from that of HIV.

CONCLUSIONS: HCV

- The lowest of the TTI markers with an overall prevalence of 0.03%
- Highest amongst males and donors over 60 years old at (both 0.4%).
- Raises interesting question of why South Africa is so different from most other countries in Africa (and the world) regarding HCV epidemiology!
- (N.B. some previous review articles gave erroneous impression of higher HCV prevalence – high risk populations and/or lack of Ab confirmation)

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