



# EPIDEMICS FROM THE GUTTERS: FROM POLIO TO HEPATITIS A

IWA

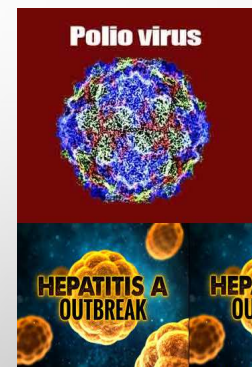
15.10.18

BAR-OR I., MANOR Y., SHULMAN L., SOFER D.,  
HINDIYEH M., ASULIN A., AGABYEV E., COHEN Z.,  
GOZLAN Y., MENDELSON E. AND MOR O

**THE CENTRAL VIROLOGY LABORATORY**

## TODAY ON THE MENU

- WHAT IS EPIDEMIC?
- POLIO VIRUS
- THE ENVIROMENTAL SURVEILLANCE
- THE SILENT OUTBREAK
- HEPATITIS A VIRUS
- THE CLINICAL OUTBREAK
- SUMMARY



## WHAT IS AN EPIDEMIC?

- FROM GREEK *EPI* "UPON OR ABOVE" AND *DEMOS* "PEOPLE".
- RAPID SPREAD OF INFECTIOUS DISEASE TO A LARGE NUMBER OF PEOPLE IN A GIVEN POPULATION WITHIN A SHORT PERIOD OF TIME.
- **JOHN SNOW**- ONE OF THE FATHERS OF MODERN EPIDEMIOLOGY. TRACING BY WATER SUPPLY THE SOURCE OF A CHOLERA OUTBREAK IN SOHO, LONDON, IN 1854



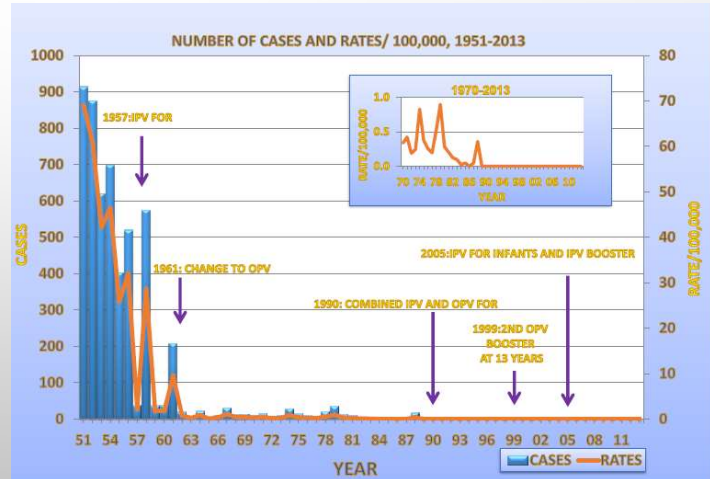
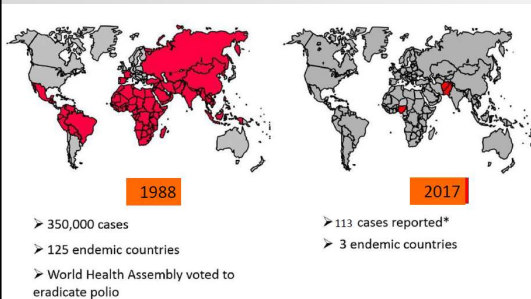
## POLIO VIRUS

- BELONGS TO THE ENTEROVIRUSES, PICORNAVIRIDIE FAMILY.
- POLIO IS A SMALL NON ENVELOPED SSRNA VIRUS (30NM).
- 3 GENOTYPES (1,2-EXTINCT, 3).
- HAVING NO LIPID ENVELOPE - IT RESISTANT TO MANY ENVIRONMENTS, HEAT AND DETERGENTS.
- FECAL ORAL TRANSMISSION.
- >90% ASYMPTOMATIC INFECTIONS.
- LESS THEN 1% OF CASES- POLIOMYELITIS PARALYSIS.
- 2 VACCINES AVAILABLE: ORAL POLIO VACCINE (1961), INACTIVATED POLIO VACCINE (1955).



# POLIO EPIDEMICS

- INTRODUCTION OF THE VACCINES DRAMATICALLY DECREASED THE NUMBER OF INFECTIONS BUT TRANSMISSION IS STILL OCCURRING.
- WHO DECLARES ON ERADICATION PROGRAM FOR POLIO.
- THE LAST MAJOR OUTBREAK OF POLIO IN ISRAEL- IN 1988.



# ENVIRONMENTAL SURVEILLANCE- TILL 4/13

- SEWAGE SAMPLE REPRESENT LARGE PORTION OF THE POPULATION.
- AROUND 12-20 SEWAGE SAMPLES A MONTH
- ISRAEL
  - HAIFA (1)
  - DAN REGION (2-4) – OVER 10 CITIES AND COMMUNITIES
  - JERUSALEM (3)
  - BEER SHEVA (1)
  - RAHAT (1)
- PALESTINIAN AUTHORITY
  - 7-9 COMMUNITIES
- GAZA
  - 4 COMMUNITIES



## THE SILENT POLIO OUTBREAK

- IN MID MAY 2013, A POSITIVE PLAQUE ASSAY (IN L20B CELL CULTURE) WAS IDENTIFIED. THE SEWAGE SAMPLE WAS COLLECTED IN RAHAT.
- IN END OF MAY 2013, SEQUENCE ANALYSIS REVEALED IT TO BE WILD POLIO VIRUS TYPE 1 (ORIGINALLY FROM AFGHANISTAN).
- MOH AND WHO WERE INFORMED AND ACTED AS FOLLOWS:
  1. ENVIRONMENTAL SURVEILLANCE WAS INCREASED IN ALL OVER ISRAEL
  2. IPV VACCINE FOR RAHAT IMMEDIATELY.
  3. CLINICAL SURVEILLANCE FOR PARALYSIS WAS ENHANCED
  4. SEROLOGICAL SURVEY FOR IMMUNIZATION STATUS OF ISRAEL POPULATION.

משרד הבריאות הודיע על הרחבת מבצע חיסון הפוליו לילדים בכל הארץ

החל מה-18 באוגוסט ייקראו הורים לילדים בגילי 4 חודשים ועד תשע וחצי לקבל את החיסון בטיפת חלב; הסיבה: הגוף אומר שוב במערכת ביוב במרכז

נגיף פוליו התגלה בבאר שבע

שבוע אחרי הגילוי ברהט: הגוף שעלול לגרום לשינוק מתפשט • שרית רזונבלום, עמ' 13

## THE SILENT OUTBREAK ONGOING

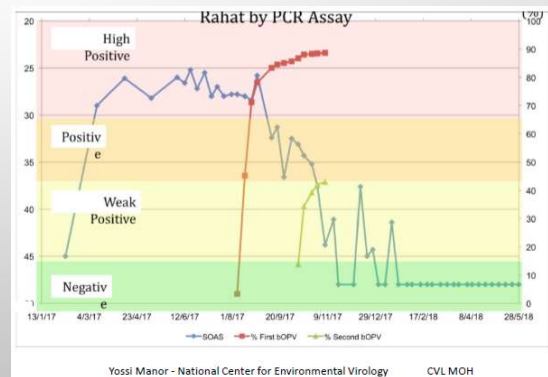
- THE ENHANCED ENVIRONMENTAL SURVEILLANCE IDENTIFIED POSITIVE SEWAGE SAMPLES ALSO IN THE CENTER OF ISRAEL.
- IN AUGUST MOH DECIDED TO GIVE BOPV TO ALL CHILDREN BELOW THE AGE OF 9.
- NEW MOLECULAR METHODS WERE DEVELOPED TO DEAL WITH THE MASSIVE QUANTITY OF SAMPLES.
- STOOL SURVEY WAS INITIATED FOR ASSESSMENT OF POLIO DISTRIBUTION IN THE ISRAELI POPULATION

District Month	South	Center	Jerus.	T.A	North	Haifa	P.A	Gaza	Total
May	2		3				7		12
June	22	1	3		5	5	7	4	47
July	25	13	3	2			10	4	57
Aug	35	28	8	4	18	3	47	2	145
Sept	23	13	4				9	4	53
Oct	38	13	3					4	58
Nov	12	8	3	1		1	12		37



## RESULTS OF THE OUTBREAK

- NO CLINICAL ILLNESS WAS FOUND.
- 59/2500 STOOLS WERE POLIO POSITIVE.
  - 53/59 WERE FROM BEDOUINS (57% INFANTS, 36% KIDS 2-8).
- **THIS IS THE FIRST TIME POLIO EPIDEMIC WAS DECLARED BY ENVIRONMENTAL FINDING AND NOT CLINICAL.**
- **WITHOUT ENVIRONMENTAL SURVEILLANCE NOBODY WOULD HAVE KNOWN ABOUT THE EPIDEMIC**



## THE REMAINS OF THE OUTBREAK

**IN THE END OF 2014 ISRAEL WAS FREE OF POLIO BUT:**

1. ENVIRONMENTAL SURVEILLANCE IS STILL INCREASED
2. TWO DOSES OF BOPV IS STILL GIVEN TO KIDS.
3. ENHANCED CLINICAL SURVEILLANCE.

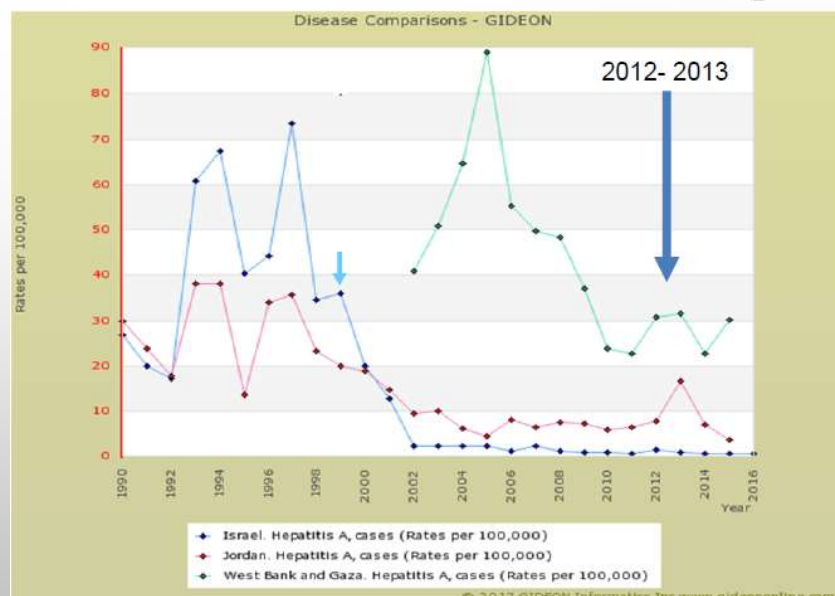
## HEPATITIS A VIRUS (HAV)



- BELONGS TO THE HEPATOVIRUS OF PICORNAVIRIDIE FAMILY:
  - SSRNA , NON ENVELOPED VIRUS. WITH 7 GENOTYPES.
- VERY RESISTANT FOR MANY ENVIRONMENTS, HEAT AND DETERGENTS.
- FECAL ORAL INFECTION OR INFECTED WATER OR FOOD.
- HAV INFECTION CAUSES ACUTE LIVER DISEASE.
- 1.5 MILLION PEOPLE ARE INFECTED EACH YEAR. 90% DON'T HAVE ANY SYMPTOMS. LESS THEN 0.5% DIE FROM HAV
- VACCINE FOR HAV WAS INTRODUCED IN 1992 AND ENTERED THE ISRAELI VACCINATION PROGRAM IN 1999.

## HAV EPIDEMIC

- LAST OUTBREAK IN ISRAEL WAS IN 2012-2013.
- ABOUT 80% OF CASES WERE FROM SOUTH TEL AVIV



## HAV EPIDEMIC IN EUROPE 2016

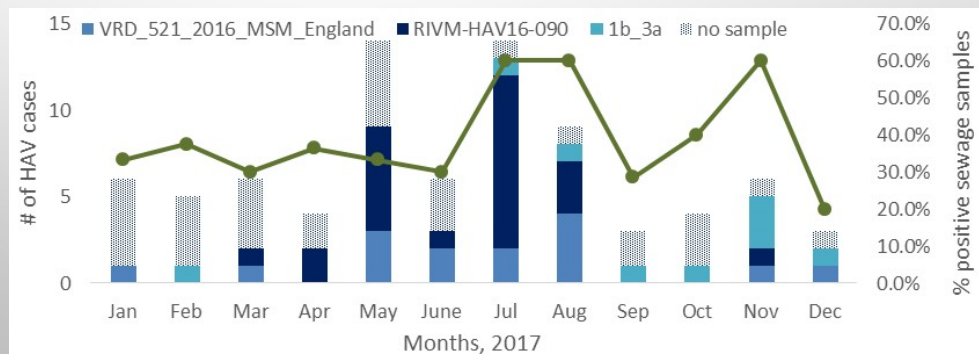
- SINCE JUNE 2016 A HAV OUTBREAK MAINLY AMONG MEN HAVING SEX WITH MEN (MSM) HAS STARTED IN EUROPE.
- IN MARCH 2017 MOH NOTICED HAV ABNORMAL CLINICAL CASES IN TEL AVIV.
- THE ENHANCED ENVIRONMENTAL SAMPLING USED FOR POLIO WAS USED FOR HAV.
  - 14 SITES ,114 SAMPLES SHOW THAT TEL AVIV, HAIFA AND BEER SHEVA HAVE MORE THEN 40% POSITIVE RESULTS IN RT PCR METHOD.

STFs	All 2017					Positive 2017					% pos
	Q1	Q2	Q3	Q4	Total samples	Q1	Q2	Q3	Q4	Total samples	Total
Jerusalem	9	9	9	9	36	0	0	1	1	2	6%
Beer-Sheva	3	3	3	3	12	1	1	2	1	5	42%
Tsfat	3	3	3	3	12	0	0	0	0	0	0%
Haifa	3	3	3	3	12	2	1	2	3	8	67%
Tel Aviv area	9	12	10	11	42	5	7	9	4	25	60%
Total	27	30	28	29	114	8	9	14	9	40	35%

## ISRAEL HAV 2017

- ANALYSIS OF 81 POSITIVE CLINICAL SAMPLES FOUND 2 HAV GENOTYPE 1A SUBTYPES SIMILAR TO THE EUROPEAN OUTBREAK.
- THE SEWAGE SAMPLES HAD MIXTURE OF THE 2 HAV 1A SUBTYPES.
- THE ENVIRONMENTAL SURVEILLANCE SHOW THE SAME TREND OF HAV OUTBREAK.

- **THE CLINICAL AND ENVIRONMENTAL POSITIVE SAMPLES DECREASE BY THE END OF 2017.**



## SUMMARY

- ONE SEWAGE SAMPLE REPRESENT LARGE PORTION OF THE POPULATION.
- TWO OUTBREAKS: THE FIRST WAS INITIALLY DETECTED BY THE ENVIRONMENTAL SURVEILLANCE; IN THE SECOND THE ENVIRONMENTAL SURVEILLANCE SUPPORTED THE CLINICAL FINDINGS.
- ENVIRONMENTAL SURVEILLANCE IS IMPORTANT FOR DETECTION OF DISEASES EXCRETED BY URINE AND STOOL



**Thank you for listening**



**Thanks the Central  
Virology lab Team**