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A vaccination campaign for gypsy children in Rome

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Background

Several epidemiological investigations conducted in Rome have shown low levels of vaccination coverage in its gypsy communities[1-3]. Inadequate immunisation, along with precarious conditions of life and health[4-6] and reduced access to health services[7,8], exposes this population to a significant risk of negative health outcomes associated with epidemic diffusion of illnesses which are preventable by vaccination.

Aim

A vaccination campaign targeting 2400 gypsy children aged 0-14 years, present in 32 settlements in Rome, was conducted in 2002 with the principal intention of rapidly obtaining an adequate immunisation.

Methods

The campaign was carried out between March and October 2002 and related to all vaccinations which are obligatory or recommended in Italy: diphtheria, tetanus, hepatitis B, pertussis (whooping cough), haemophilus influenzae and measles.

In the majority of cases it was decided to carry out the vaccinations directly in the gypsy camps, in accordance with the methods of *pulse immunisation.* However, in the case of small settlements a strategy of orientation to vaccination centres was adopted.

A total of 250 workers took part in the campaign, from both public healthcare institutions and private organisations.

Results

Around 2000 children were vaccinated, equivalent to 80% of the paediatric population present during the period. Over 10 500 doses of vaccine were administered.

The number of children who have never been vaccinated has been halved, from 40% prior to the campaign to 20% after the third week.

Vaccination coverage in medium- and small-sized camps (less than 200 inhabitants) after the campaign shows values of over 70% (Tables 1 and 2), reaching in many cases a satisfactory level of immunisation, over 80%. In the large camps, given the difficulties of involving the population in the campaign, because of a higher density of inhabitation and environmental degradation, more modest increases have been recorded and coverage has rarely exceeded 50%.

Conclusions

This experience has illustrated the importance of networking and of synergy between public healthcare institutions and private organisations. The mobilisation of a wide range of competences has thus

enabled the attainment of a high level of effectiveness.
In addition it has made evident the problem of large settlements in terms of epidemic risk and degradation of general conditions of life and health of the inhabitant population.

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Table 1 - Levels of coverage for obligatory vaccinations before and after the campaign, listed by ASL and settlement: strategy of orientation to vaccination centres.

ASL	Camp	Diphtheria-Tetanus		Poliomyelitis		Hepatitis B	
		% before	*% after*	*% before*	*% after*	*% before*	*% after*
RMA	Campo Boario	69	70	65	70	69	65
	Foro Italico	92	61	96	64	81	53
	Total RMA	81	66	81	67	75	59
RMC	Arco di Travertino	86	91	86	91	76	83
	Gordiani	91	93	91	93	91	92
	Total RMC	90	93	90	93	88	90
RMD	Ortolani	21	57	21	57	11	29
	Villa Troili	4	33	4	33	4	33
	Total RMD	10	36	10	36	6	33
RME	Lombroso	70	70	70	70	64	65
	Monachina	86	82	86	82	83	79
	Total RME	75	74	75	74	70	69
Total		64	70	64	71	60	66

Table 2 - Levels of coverage for obligatory vaccinations before and after the campaign, listed by ASL: strategy of *pulse immunisation*.

ASL	Camp	Diphtheria-Tetanus		Poliomyelitis		Hepatitis B	
		% before	*% after*	*% before*	*% after*	*% before*	*% after*
Small- and medium-sized camps							
RMB	Collatina vecchia	33	66	36	63	30	61
	Cortina	43	94	43	94	29	94
	Dameta 55	45	52	45	52	30	48
	La Martora	68	87	64	91	44	91
	Luigi Nono	9	-	9	-	0	-
	Montegiorgio	92	87	92	87	75	73
	Naide	0	80	0	80	0	80
	Ponte Mammolo	45	75	45	75	45	75
	Salviati 71	24	-	24	-	24	-
	Smith	63	100	56	100	50	83
	Togliatti 1011	67	67	67	67	67	67
	Togliatti 1100	69	85	69	85	69	85
	Total RMB	45	75	45	74	36	71
RMC	Tor Pagnotta	40	71	34	65	37	65
	Torricola	25	-	25	-	25	-
	Total RMC	37	71	33	65	35	65
Total		43	74	43	73	36	70
Large camps							
RMB	Acqua vergine	24	72	24	72	19	68
	Casilino 900	28	44	29	45	27	45
	La Barbuta	20	27	21	27	15	26
	Salone	29	36	33	39	23	35
	Salviati 72	23	30	23	30	21	30
	Total RMB	26	40	27	41	22	38
RMC	Savini	60	75	59	72	53	71
	Tor de' Cenci	60	82	60	82	59	79
	Totale RMC	60	77	59	75	55	73
RMD	Candoni	2	42	2	37	0	34
	Muratella	5	35	6	35	1	27
	Total RMD	4	39	3	36	0,32	30
RME	Baiardo	59	63	60	64	58	62
Total		33	49	34	49	30	46

Asthma and allergies among Italian children: the SIDRIA-2nd phase study

*Galassi C, Sestini P, Rusconi F, Forastiere F, La Grutta S, Viegi G, and Sidria-2 Collaborative Group**

Background – In 1994/1995 a survey was conducted in 10 areas of Northern-Central Italy to provide data on the prevalence of asthma and allergies in children, and to identify possible risk factors for such conditions (SIDRIA- Italian Studies on Respiratory Disorders in Children and the Environment – 1st phase).
Objectives - In the year 2002 a second population based survey was conducted in 13 areas of Northern, Central and Southern Italy (SIDRIA-2nd phase). The main objectives were: i) to improve national estimates of the prevalence of asthma and allergies in children; ii) to evaluate time trends in the prevalence of asthma and allergies in the areas where SIDRIA-1st phase had been performed; iii) to investigate the determinants of the access to healthcare services for asthma in Italy.
Methods - 16175 adolescents (13-14 yrs old) and 20016 children (6-7 yrs old), living in 13 areas of different size, latitude, climate and level of urbanization, participated in the study. Information on several health outcomes (including the complete set of ISAAC modules regarding asthma, rhinitis and eczema) and on many environmental risk factors were collected with questionnaires filled in by parents (for children and adolescents) and also by the adolescents themselves.
Results – Prevalence of asthma showed a small increase for both age groups (e.g. from 9,1% in 1994/95 to 9,5% in 2002 among children). Frequency of reported lifetime asthma in children was higher in Central Italy (11,1%) than in Northern and Southern areas (8,4 and 9,1% respectively); a similar pattern was observed for wheezing symptoms in the last 12 months, although differences were smaller (9, 8 and 8,4% in Center, North and South, respectively). A marked increase in the prevalence of allergic diseases such as rhino-conjunctivitis and atopic eczema was observed in SIDRIA-2nd phase, both in children and adolescents. About 30% of children with lifetime asthma had at least one lifetime hospital admission for asthma. The frequency of hospital admissions for asthma showed an inverse relationship with family's education (as a measure of socioeconomic status): e.g. among children with current asthma, frequency of two or more lifetime hospital admission was 7% in families with at least one graduated parent, 14% in families with 8 school-years and 18% in families with less than 6 school-years.
Conclusions – Asthma and allergies still remain a relevant public health problem among Italian children. The disparity in the use of health care resources requires further attention.

SIDRIA-2nd phase is partially funded by the Italian Ministry of Health.

**** Sidria-2 Collaborative Group***
Ciccone G, Migliore E, Mirabelli D, Berti G, Cadum E, Bugiani M, Piccioni P (Torino); Bisanti L, Rusconi F, Russo A, Gianelle V (Milano); Piffer S, Battisti L, Kaisermann D, Gentilini M (Trento); Giannella G, Talassi F (Mantova); Galassi C, Caranci N, Frasca G, Biocca M, De Munari E (Emilia-Romagna); Chellini E, Lombardi E, Biggeri A, Gabellini C, Grechi D (Firenze); Petronio MG (Empoli); Sestini P (Siena); Viegi G, Simoni M (Pisa); Forastiere F, De Sario M, Pistelli R, Corbo G, Bonci E, Indinnimeo L, Dell'Orco V, Agabiti N (Roma); Armenio L, Brunetti L (Bari); La Grutta S (Palermo)

FAILURE TO THRIVE

(GROWTH FAILURE/ DEFICIENCY)

CHILDREN AND THE MEDITERRANEAN CONFERENCE
GENOA-ITALY, Jan, 2004

Ali Attia Al-Matti,M.B.,CH.B.,DCH, MRCP,(UK)
President of Jordan Pediatric Society
AMMAN / JORDAN

INTRODUCTION

Normal growth is a continuous dynamic process that is partly predictable.
Thriving involves vigour, strength,and developmental progress ,as well as growth .
-It requires:
(a) a proper genotype
(b)a proper physical & emotional environment
(c)adequate nutrition
(d)adequate tissue utilization

FTT is a common & important health problem worldwide,responsible for millions of morbidities &deathes each year.The term FTT was first used by **L.Holt** in 1933 in his textbook of "Diseases of infancy&Childhood. It is defined as " failure to gain weight; or inadequate rate of growth in infants & young children(less than 3 years of age) whose weight is below the third percentile for age & sex ; or those whose weight crosses two major percentiles downward on a standardized growth chart".

- Weight is affected first but **Length**& then **Brain growth** and **Development** of the child may be affected in more chronic malnutrition .
- FTT accounts for up to 10% of patients seen in primary child health care clinics & for~ 3% of pediatric hospital admissions.
- 80% of cases occur in the first 18 months of age & up to **40%** of infants with FTT have birthweight less than 2500 grams.
FTT is not a diagnosis,but is a sign of inadequate rate of growth that is caused by many chronic conditions or diseases,(Walker Smith et al,1983).

CLASSIFICATION:
1.Organic FTT .
2. Non-organic (Psycho-social)FTT.
3. Mixed form.
The incidence and distribution of the great number of pathologic and psycho-social factors causing FTT vary widely between the different communities due to economic, geographic, social & other factors. This divides the countries and the populations in to : **Developed**, and a wide range of **Developing** Countries .

PATHOGENESIS:
Malnutrition or undernutrition is the primary biologic insult in both types of FTT(organic & non-organic).This means that at a certain stage they will have similar pathologic manifestations and complications of malnutrition.
- FTT is produced by the following mechanisms:
1- decreased caloric intake
2- impaired digestion & absorption
3- increased losses
4- excessive energy demands & defective energy utilization.

ETIOLOGY: any clinical condition or disease of severe degree or chronic course can lead to FTT , the onset of which may be : ***Prenatal, Perinatal*** or **postnatal.**

However in the developed countries the majority of cases (80-90%) can be attributed to two important categories :

1.NORMAL VARIANTS: familial , genetic or constitutional factors are responsible for ***Small Normal Children***.

2. NUTRITIONAL DEPRIVATION: secondary to psychosocial factors or organic disorders .

Psycho-social F.T.T. Causes:

- Ñ In Developed communities : marital discord, single parents, unemployment ,child abuse or neglect,alcohol or drug abuse, parents with mental disorder or low intelligence, abnormal,demanding or unwanted child…….

*In Developing communities ,mainly caused by:

1. Poverty :lack of food,poor housing and sanitation….and limitation of resources.
2. Inadequate health care services and system
3. Wrong feeding and dietary practices and early cessation of breast feeding.

- 4.Lack of Health Education.
- 5.Increased incidence of infections and infestations.
- 6.Problems related to local conflicts and wars.
- In **JORDAN** organic causes account for more cases of FTT than non-organic causes. But in Rural areas adverse social factors have more contribution to FTT than in Urban areas.

ORGANIC F.T.T

** PRE-NATAL and PERINATAL FACTORS :

A. Genetic and chromosomal disorders.

B. Intra-uterine Growth Retardation= SGA babies with or without congenital mal-formations,due to maternal,fetal and utero-placental problems,such as TORCHES infections and teratogenic agents.Birth asphyxia,prematurity and its complications.

** Chronic systemic disorders: as asthma,cystic fibrosis,immune deficiencies & chronic infections,malabsorption disorders as celiac disease, …etc.

Idiopathic Transient F.T.T.!!

Some cases fail to grow normally during the first one or two years of life,having no evidence of significant organic or psycho-social disease, but then by supportive management only and on regular follow up they reach their normal potential for growth. Familial pattern is noted.

MIXED FTT : due to the presence of and / or interaction between both organic and non-organic factors .

DIAGNOSIS OF F.T.T.

FTT is a challenging medical problem to the pediatrician. It requires the use of maximum clinical skills . Early recognition of deviation of the growth parameters of a child from the norms is important for early workup and diagnosis and to avoid serious complications of chronic malnutrition and to relieve parental worries .

DETAILED HISTORY: starting from the Prenatal, Perinatal and Postnatal risk factors. Nutritional,Feeding, Social , developmental ,and family history.

DIAGNOSIS OF F.T.T.
PHYSICAL EXAMINATION

First,confirm the presence of F.T.T. by Plotting the growth parameters on a Standard Growth Chart.
Special Growth Charts are present for Down's syndrome and for preterm infants.
Serial mesurements are more important than a single plot in indicating the deviation from normal pattern of growth, as well as its onset and severity .

In ***Preterm*** **babies** correction for weight,length and head circumference should be done until 18 months , 24 months , 40 months respectively".

Examine for : Dysmorphic features , specific signs of the underlying disease and for signs of wasting & deficiencies : loss of subcutaneous fat and muscle.
Observe the behaviour ,mood and activity of the child
Look for signs of child abuse or neglect.
Observe the interaction between the child and the parents or caregivers .

ÑINVESTIGATIONS

SCREENING TESTS: complete blood count & ESR ,urine analysis & culture, serum electrolytes , glucose , creatinine , and stool analysis . S.Ca, Fe , Zn, proteins & albumin levels may be requested .

4. SPECIFIC TESTS & PROCEDURES : should be done only as indicated from the clinical data. Like Sweat chloride test in cystic fibrosis, Jejunal biopsy in celiac disease and so on . Berwick et al found that laboratory tests were of diagnostic significance in only 0.8% of cases admitted to hospital .

MANAGEMENT

Ñ A team approach is required which includes : a pediatrician,nurse,dietitian,social worker and other sub-specialties in cooperation with the family. Most cases can be treated at OUT-PATIENT CLINICS.

HOSOITALIZATION is indicated in :

Severe or complicated cases, failure of outpatient management or in suspected child abuse.

NUTRITIONAL SUPPORT

Ñ It should be started early and has to be continued as long as the patient is under investigation .

Ñ For Catch up growth ,the Caloric intake and Protein intake should be 1.5-2 times the daily requirement for the expected weight for age : Kcal/kg/day =120 X median wt.(kg) / current weight(kg).

** Depending upon the diagnosis ,severity and the available medical facilities,treatment may include the following :

* **Enternal** feeding or Gastrostomy tube feeding .
* **Total parenteral nutrition (TPN).**
* Correct mineral & trace element deficiencies : Iron ,Zinc ,Calcium and Vitamines.
* **Treat infections** and other complications .
* **Treat the underlying disorder** if possible
* **Support the family** by all possible means.

• **Accelerated growth** must be maintained for 4-9 months to restore the child's weight for length .

LONG-TERM FOLLOW-UP: is needed to ensure that adequate rates of growth & development are achieved & maintained .

PROGNOSIS:

depends upon the nature of the original disorder ,the severity & duration of malnutrition , the availability of medical & social services in the country & the cooperation of the family with the treating team.

* Non organic FTT is generally more difficult to manage,especially in situations of famines or extreme poverty affecting large communities,which calls for International cooperation and humanitarian support.

PREVENTION of F.T.T.

1. Health education of mothers , families and the community. Encourage breast feeding in infants.
2. Provision of adequate health & medical care services .
3. Early ,detection, referral & management by the Primary care physicians & pediatricians.
4. Improving the nutritional status of children in poor families by food assistance programs.
5. Protection of childen from neglect (abuse).

OUR GOAL ..

OUR ULTIMATE GOAL IS A THRIVING CHILD IN A THRIVING FAMILY

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Encyclopaedia of the Orient
E.O
PETRA, JORDAN

Health Profile of the Jordanian Child

Prof. Dr. Sa'ad S. Hijazi

Professor of Nutrition and Child Health

President of the Royal Scientific Society

"Children and the Mediterranean"
Genoa, 6-9 January 2004.

Data shown in this presentation is either from the author's own work or the Department of Statistics/Jordan

Jordan

- **Population:** 1961: 901,000
  2002: 5.3 millions
- **Population Growth:**
  1961-1979: 4.8%
  2002: 2.8%
- **Fertility:**
  1970: 7.4 children/woman
  2002: 3.7 children/woman

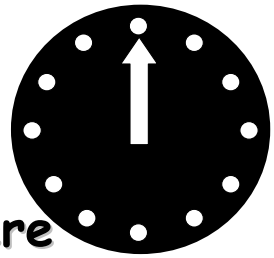
- **Infant Mortality Rate:**
  1976: 82 per 1000
  2002: 22 per 1000
- **Life Expectancy:**
  2002: 71.1 years for females
  68.8 years for males
- **Education:**
  1/3 of Jordanian population are students (all levels)
- **Illiteracy:**
  1979: 15 years+ 35.5 %
  2002: 15 years+ 10.3 %

Infant Feeding and Children's and Women's Nutritional Status

- Breastfeeding and Complementary Feeding
- Nutritional Status of Children
- Nutritional Status of Women
- Micronutrients and Anemia

Initiation of Breastfeeding

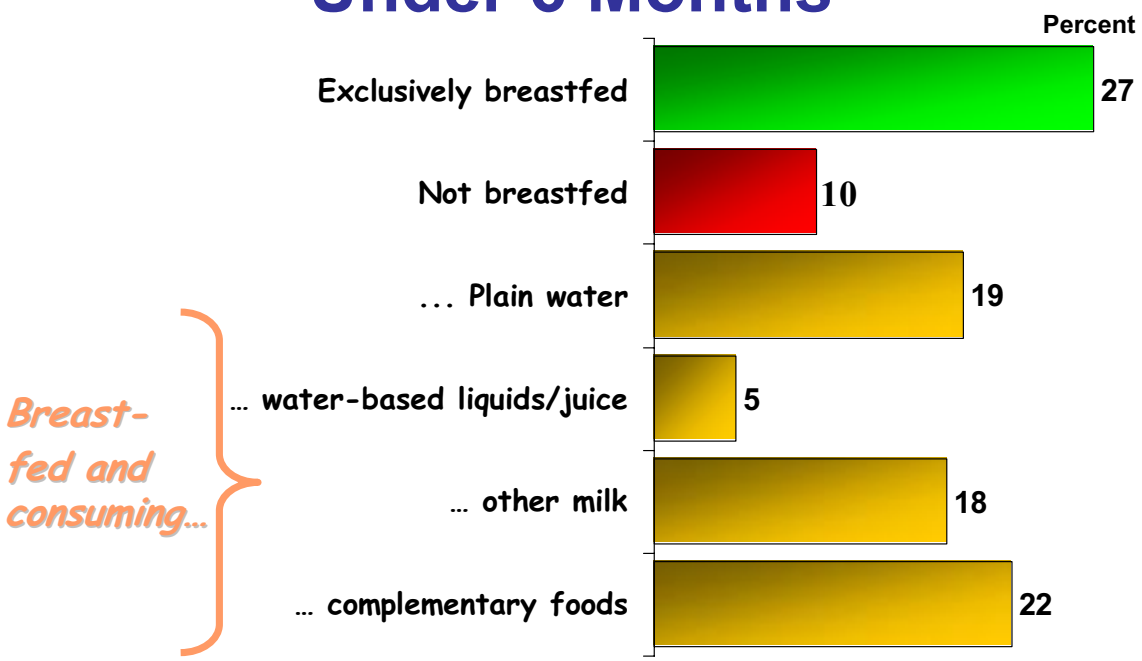
94% of children born in the last five years have been breastfed.



Only less than half of them, 40%, were breastfed within one hour of birth, and 79% were breastfed within 24 hours of birth.

61% of children were given prelacteal feed during the first three days before being breastfed regularly.

Breastfeeding Status of Children Under 6 Months



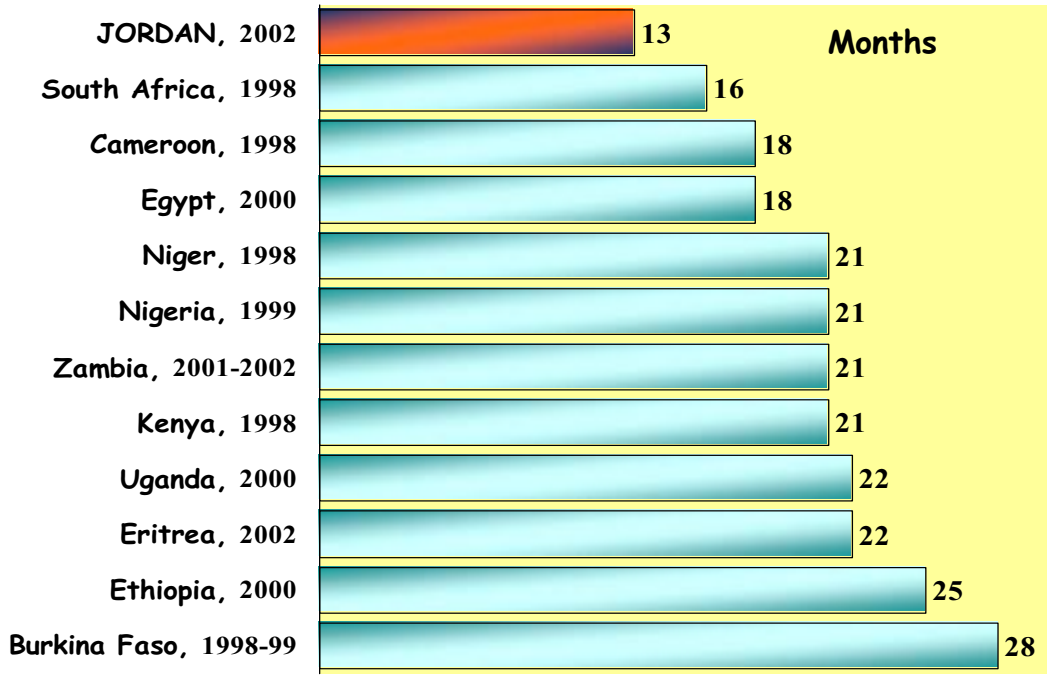
Duration and Frequency of Breastfeeding

The median duration of any breastfeeding among children in Jordan is 13 months.

91% of breastfeeding children under six months were breastfed 6+ times in the last 24 hours.

The mean number of day feeds was 6 and 3 for night feeds.

Median Duration of Breastfeeding in Selected Countries



Complementary Feeding

WHO recommends the introduction of complementary foods at 6 months.

From 6 months onwards, breastmilk alone is no longer sufficient to ensure proper growth of children.

22% of breastfeeding children under 6 months consume complementary foods.

70% of breastfeeding children 6-9 months consume complementary foods.

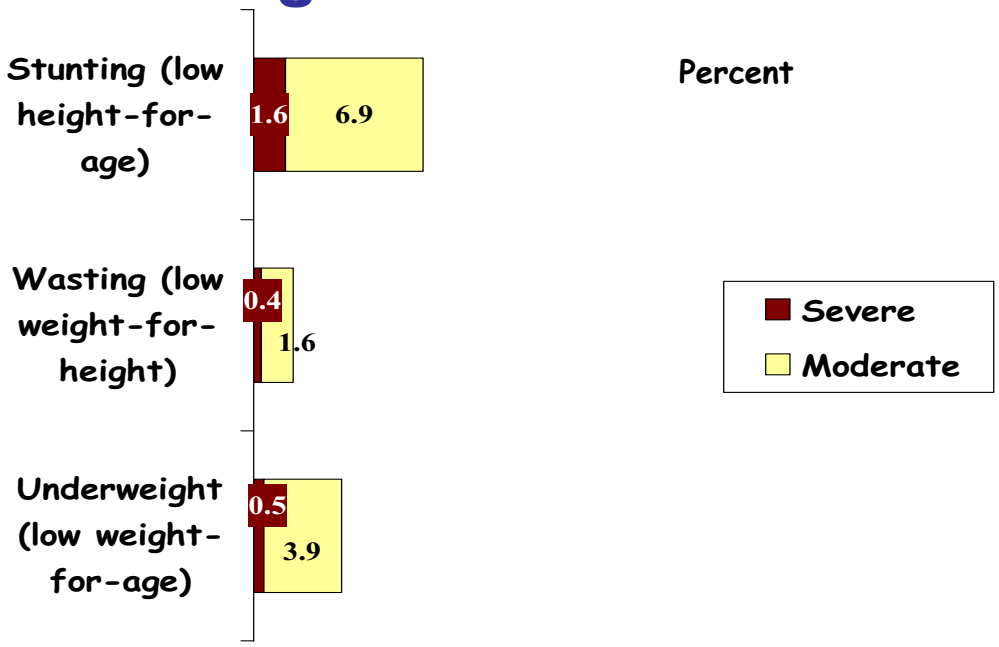
E2

WORKSHOP II

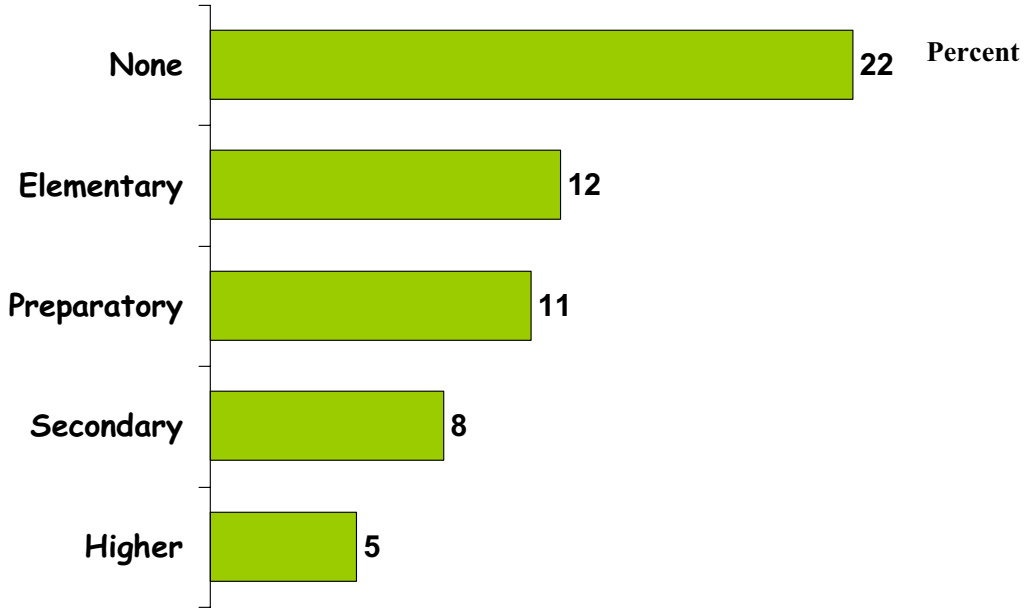
Infant Feeding and Children's and Women's Nutritional Status

- Breastfeeding and Complementary Feeding
- Nutritional Status of Children
- Nutritional Status of Women
- Micronutrients and Anemia

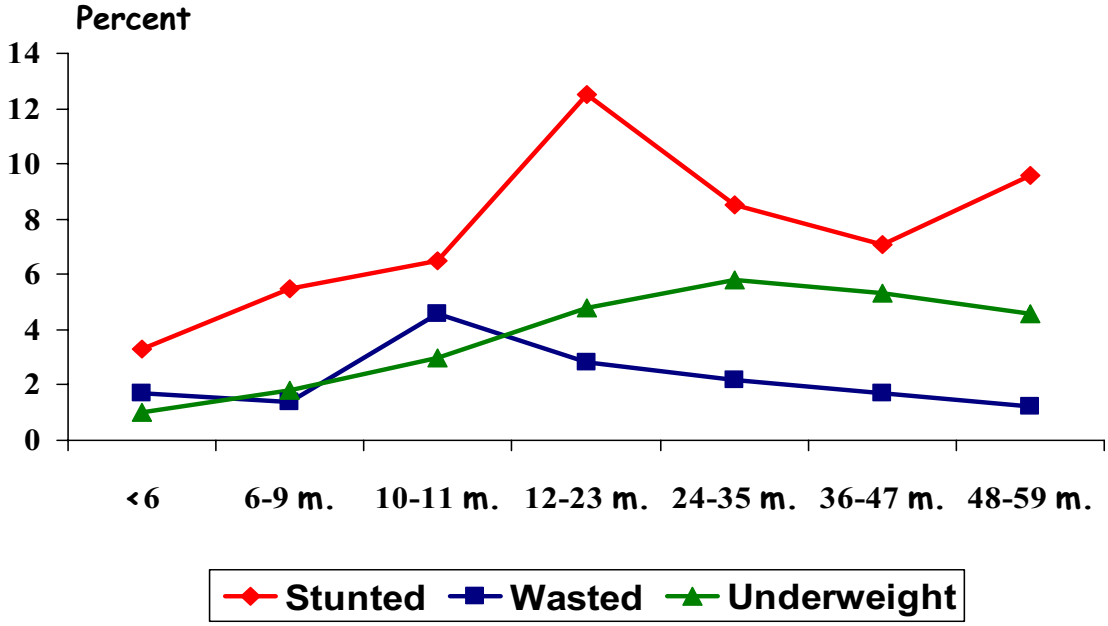
Level of Malnutrition Among Children Under 5



Stunting Among Children Varies Much by Mother's Level of Education



Nutritional Status of Children by Age (in Months)



Infant Feeding and Children's and Women's Nutritional Status

Breastfeeding and Complementary Feeding

Nutritional Status of Children

Nutritional Status of Women

Micronutrients and Anemia

Body Mass Index (BMI)

With the information on height and weight, we can derive a useful measure of nutritional status for a woman, her BMI.

A woman's height may be used to predict the risk of difficulty in delivery; the risk of giving birth to a low birth weight baby is influenced by the mother's nutritional status.

Body Mass Index (BMI)

A woman is considered to be thin if her BMI is below 18.5 kg/m^2 and is considered to be overweight/obese if it exceeds 25.0 kg/m^2.

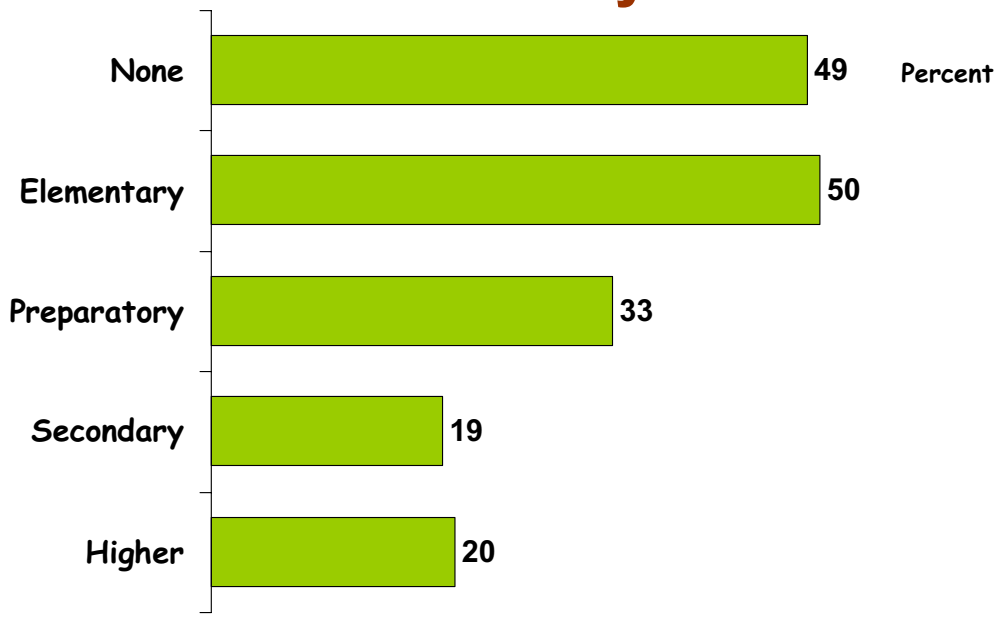
The mean BMI for women in Jordan is 27.

5% of women have a BMI of less than 18.5.

54% have a BMI greater than 25.0:
  # 28% have a BMI between 25-29 (overweight)
  # 26% have a BMI of 30 or higher (obese).

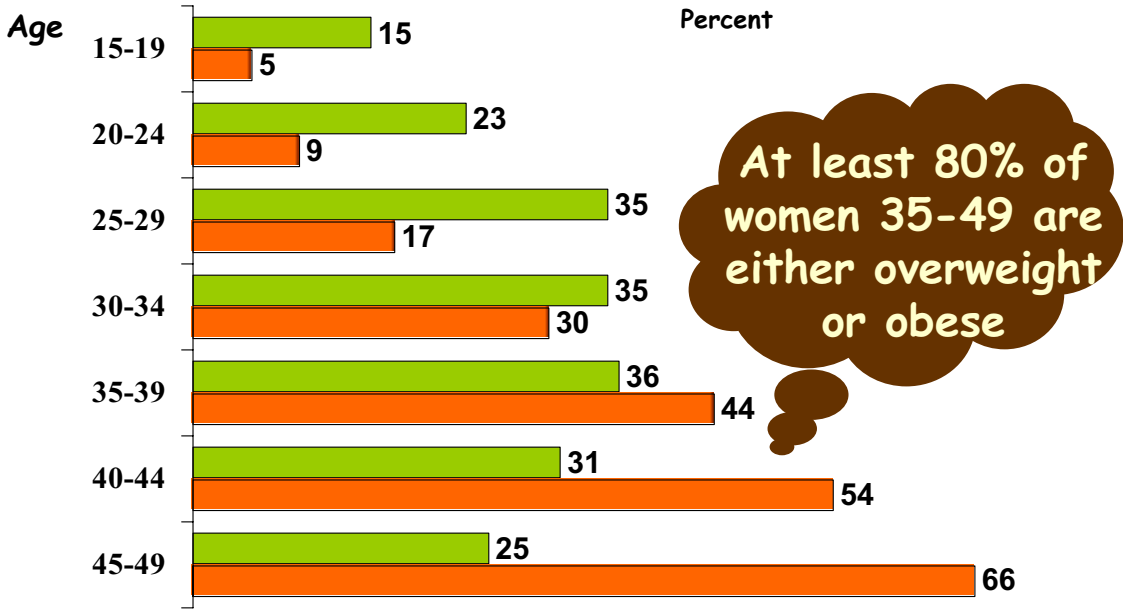
41% of women have a BMI within normal range.

The Proportion of Women Who Are Obese* Varies Much by Education



*BMI of 30 or higher.
Note: the proportion of overweight women doesn't vary by education: around 28%

The Proportion of Women Who Are Overweight or Obese Varies Much by Age



Infant Feeding and Children's and Women's Nutritional Status

Breastfeeding and Complementary Feeding

Nutritional Status of Children

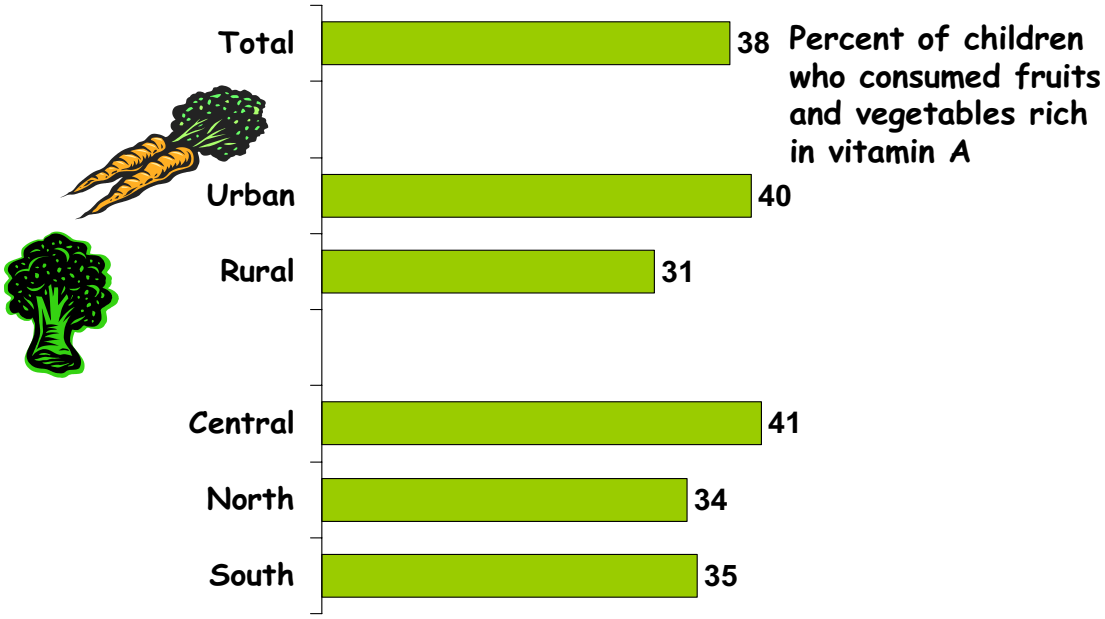
Nutritional Status of Women

→ Micronutrients and Anemia

Micronutrients: Vitamin A

- ü Micronutrient deficiency is a serious contributor to childhood morbidity and mortality.
- ü Micronutrients, such as vitamin A, are available in foods and can be provided through food fortification or direct supplementation.
- ü The effects of vitamin A deficiency range from blindness to decreased resistance to infections and increased child mortality.

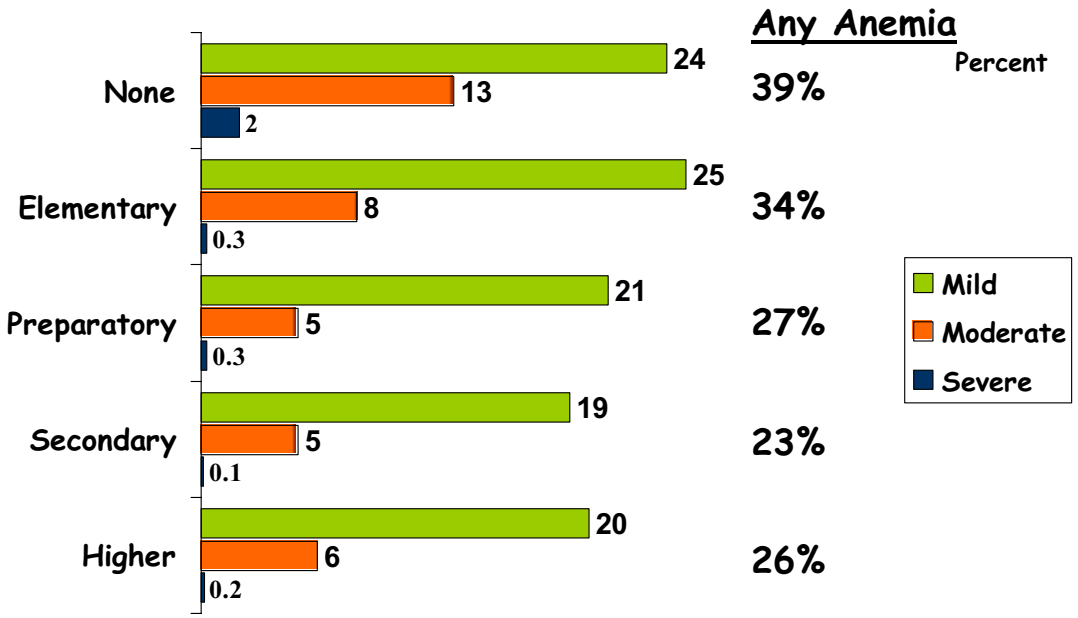
Vitamin A Consumption Among Children Under 3 in the 7 Days Preceding the Survey



Micronutrients: Iron Deficiency Anemia

- Most common micronutrient deficiency in the world (3.5 billion people).
- Occurs when iron stores are exhausted and the supply of iron to the tissues is compromised.
- Prevalence of anemia, *defined by low hemoglobin,* is commonly used to assess the severity of iron deficiency.
- Major threat to safe motherhood. It contributes to low birth weight, lowered resistance to infection, poor cognitive development and decreased work capacity.

The Prevalence of Anemia in All Women Varies by Their Level of Education*



*Not much by residence or region

Iron Supplements During Pregnancy

Among Jordanian women who gave birth in the last five years:

- 46% took iron tablets or syrup during pregnancy for 90 days or more, according to international recommendations.
- 25% took iron tablets or syrup for less than 90 days.
- 28% did not take any iron supplements.

Among children age 6-59 months, 34% are anemic:

- 21% mildly
- 13% moderately
- 0.2% severely

Kinship (or Consanguineous) Marriage

43% of women 15-49 are related to their current husband (or last husband if divorced/widowed);

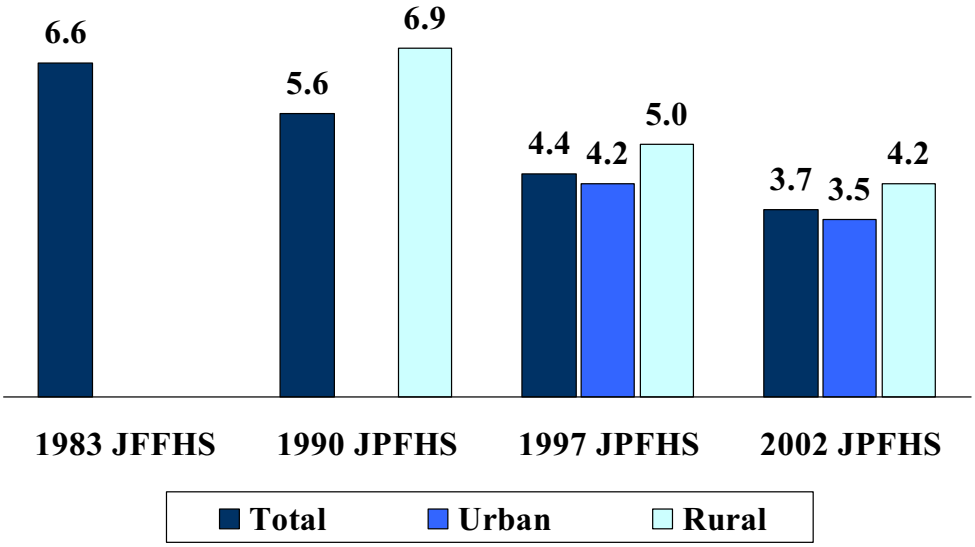
- **V4% in dual first cousin marriages;**
- **V14% married to a first cousin on the father's side and 8% on the mother's side;**
- **V15% married to second cousins;**
- **V2% married to other relatives;**

Total Fertility Rate (TFR)

At current fertility levels, a Jordanian woman will give birth to an average of 3.7 children during her reproductive years

3.7

Trends in Total Fertility Rate, by Residence



Key Findings

- Knowledge of methods of family planning is universal.
- 2 women in 3 know when they are fertile.
- 3 women in 5 disapprove of sterilization; 19% approve, 21% approve only under special circumstances. The more educated women are, the least they approve of sterilization.
- 56% of women use a method of family planning, including 41% modern methods (most common: IUD (24%) and pill (8%).
- The main reason cited by women for not using family planning is that they want as many children as possible.

2002 Jordan Population and Family Health Survey
Department of Statistics, ORC Macro

- Three-quarters of the supply for the IUD (and two-thirds for the pill and condom) come from the private medical sector.
- Around 2 in 5 contraceptive users discontinue use of a method by 12 months after beginning its use (13% for the IUD, around 55% for the pill, condom and injectables, 49% for withdrawal).
- The main reasons for discontinuation are switching to another method and method failure.
- 6 women in 10 intend to use family planning in the future; half of them would choose IUD.
- Wanting more children and being subfecund or infecund are the main reasons not to intend to use in the future.

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- 9 women in 10 are exposed to any family planning messages (TV: 76%; posters: 52%; bulletins or booklets: 48%; radio: 33%).
- Only 20% of nonusers visited a health facility and discussed family planning (61% did not discuss it).

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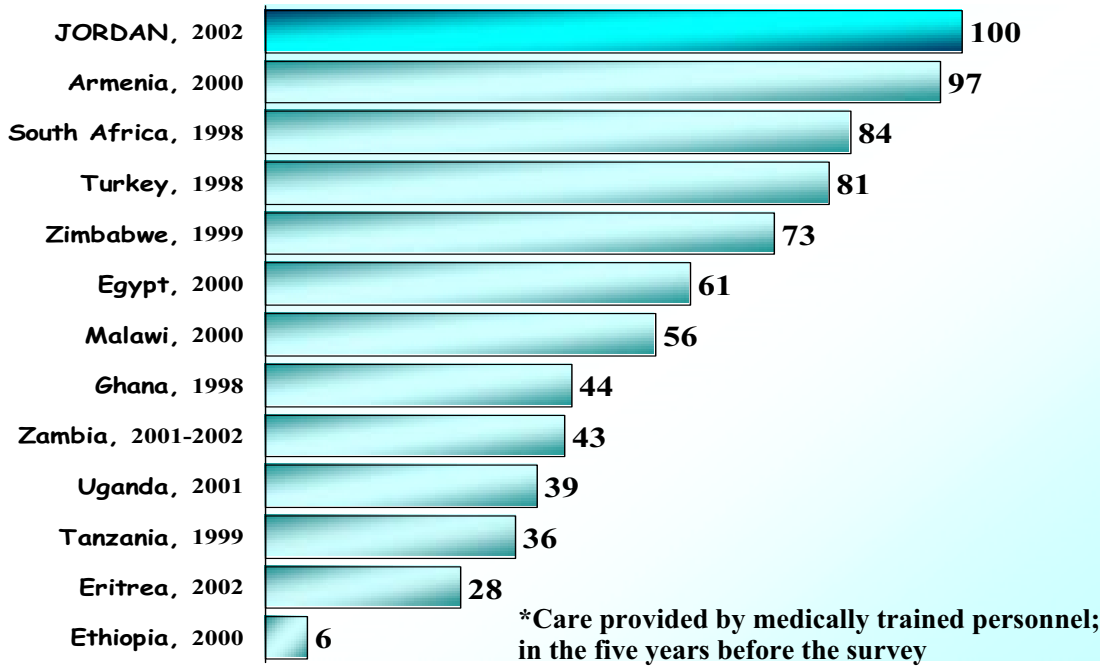
% of Women Receiving Professional Assistance at Delivery in Selected Countries*



As birth order increases, births are less likely to occur under the supervision of a doctor and more likely to be delivered by a nurse/midwife.

For example, doctors attend 74% of first births (26% for nurses/midwives) and only 57% of deliveries for sixth- or higher-order births (42% for nurses/midwives).

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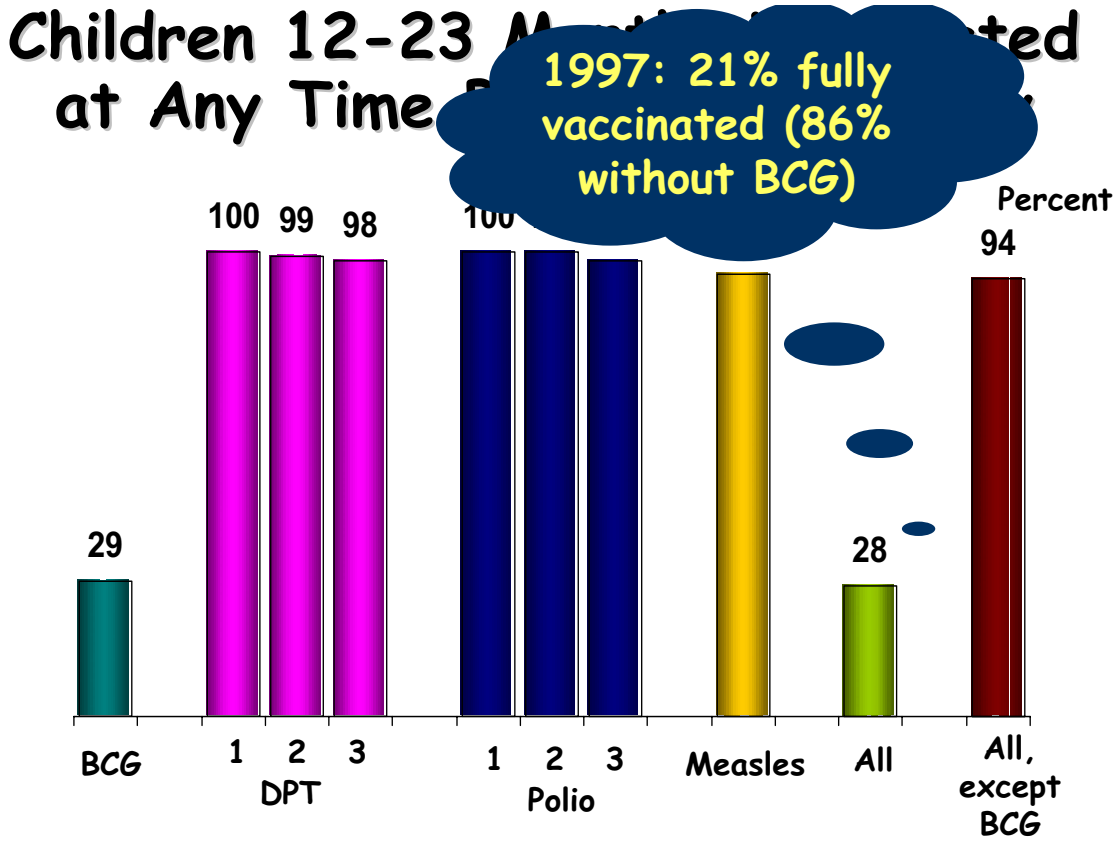


Acute Respiratory Infections (ARI) and Fever

In the 2 weeks before the survey:

6% of children under age 5 had cough and rapid breathing;

9% had fever

Treatment of children with ARI and/or fever

72% of children who suffered from symptoms of ARI and/or fever were taken to a health facility/provider*.

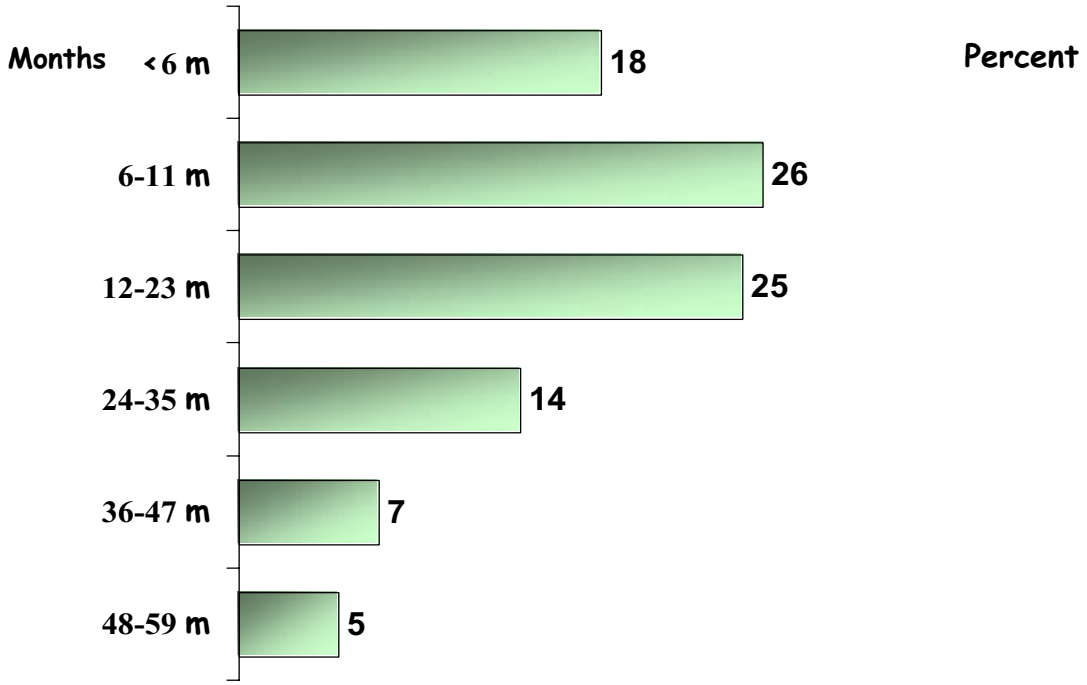
Treatment doesn't vary by residence, region or education

*Excludes pharmacy, shop, and traditional practitioner

Diarrhea

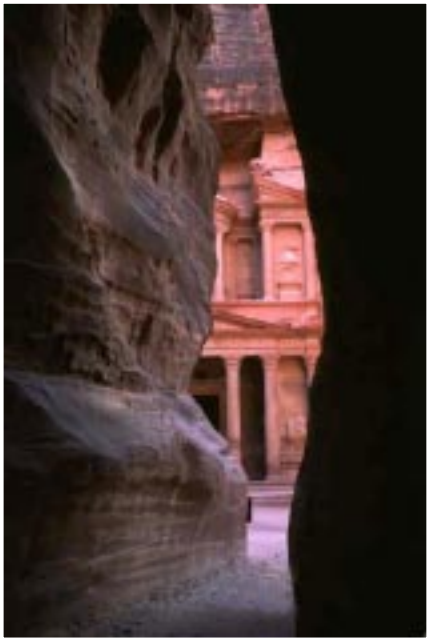
In the 2 weeks before the survey, 15% of children under age 5 had diarrhea

Diarrhea by Age of Child



- 72% of children who suffered from symptoms of ARI and/or fever were taken to a health facility/provider.
- 22% of children with diarrhea still do not receive any treatment.
- Overall, 76% of women have experienced some big problems in accessing health care. Their biggest problems are: having to take transport, distance to health facility, and not wanting to go alone.
- About 1 in 10 women use cigarettes or nargila.

Infant and Child Mortality



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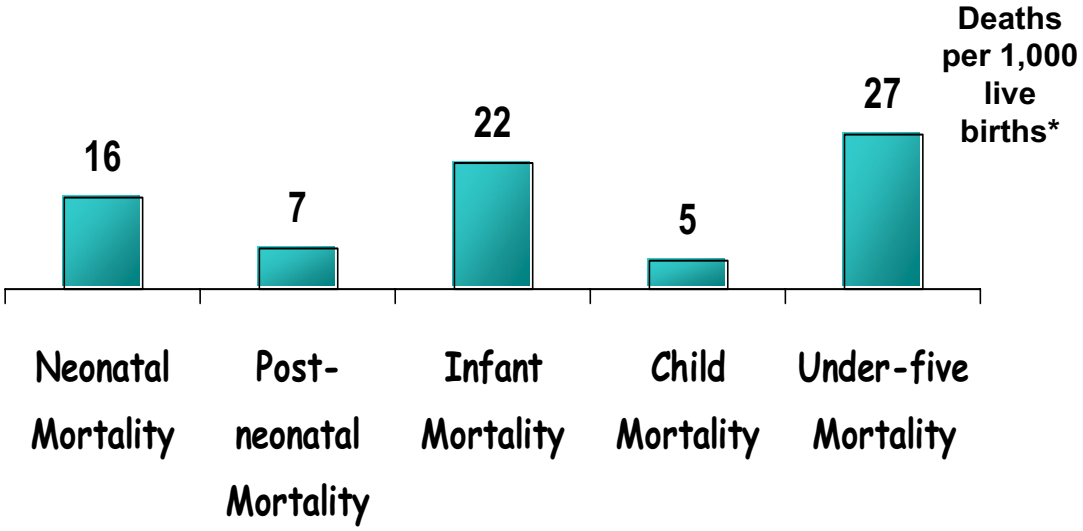
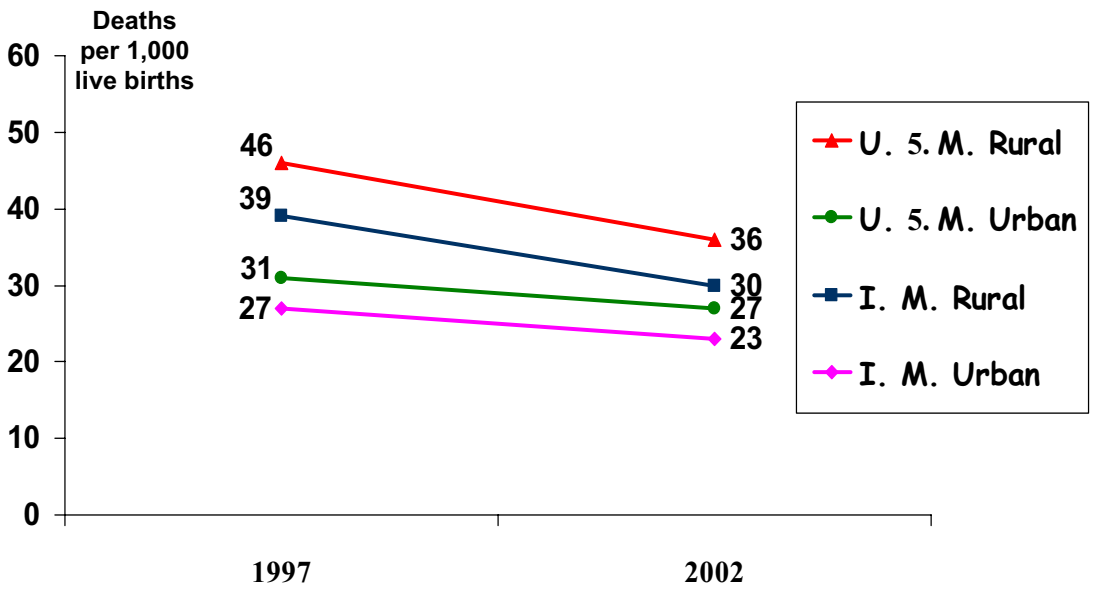
- Levels and Trends
- Differentials

Early Childhood Mortality Rates
in the five years preceding the survey



* Except child mortality, which is calculated as deaths per 1000 children surviving to 12 months of age

Trends in Infant and Under-5 Mortality Rates by Residence*



*Based on 10-year periods preceding the surveys

Key Findings

- Early childhood mortality rates keep declining and are among the lowest in the world where DHS surveys have been carried out.
- Currently, out of 1,000 live births, 22 children will not reach their first birthday and 27 their fifth birthday.
- The decline in childhood mortality since 1997 is more important in rural areas than in urban areas.
- Infant and under-5 mortality are highest in rural areas, in the north and for women with no or elementary education.

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Health Profile of the Jordanian Child

2002 Jordan Population and Family Health Survey
Department of Statistics, ORC Macro

MANDATORY VACCINATION STATUS OF PRESCHOOL AGE CHILDREN IN MONTENEGRO IN 2002

Vesna Vujovic
Boban Mugosa, Dragan Lausevic, Bozidarka Rakocevic, Veselinka Beatovic

INTRODUCTION

Montenegro is a small country in south-eastern Europe, located in the southern part of the Balkan peninsula. To the west, north and east it borders on Croatia, Bosnia-Hercegovina, Serbia and Kosovo, and to the south borders on Albania. Montenegro is a maritime country, with 200 km of Adriatic coastline. Montenegro's territory measures 13,812 square km and its population numbers about 709313. There are 65063 children between 0-6 year old in Montenegro. 6,2% of all population are IDP's (29435) and there are also 14675 refugees, what makes in total 44110.

Estimates of the population size of groups at higher risk – mobile population of Roma people, in Montenegro is 7186. 56.2% of mobile population is in the capital of Montenegro concentrated in 2 camps for Roma people (according Government of the Republic of Montenegro, Commissariat for displaced persons).

Gross National Income is 675 EUR per capita. Budget for Health is 55 mil. EUR, and 78 EUR per capita for Health (according Government of the Republic of Montenegro, Health Insurance Fund)

Health indicators of Montenegro are: Birth rate - 13,9/1000; Infant mortality rate - 8,2/1000; Overall mortality rate - 8,2/1000; Life expectancy at the birth - 76,16 years; Vital index - 5,9. (6)

Health system structure of Montenegro is the following: 23 Primary Health Care Centers, 7 General Hospitals, 3 Special Hospitals (TBC, Psychiatric, Neuro/Orthopedic Surgery), Clinic Center in Podgorica (capital town), Institute for Medical Rehabilitation and Institute for Public Health of Montenegro (7).

Mandatory immunization schedule of preschool age children (0-7 years old) in the programme of mandatory citizens immunization against specific communicable diseases on the territory of Montenegro for year 2002 includes immunization against tuberculosis, poliomyelitis, diphtheria, tetanus, whooping cough, measles, mumps, rubella (9). Immunization schedule is given as an attachment (Table 1).

MATERIJAL AND METHOD OF WORK

During February and March 2002, Center for Epidemiology , Institute of Health of Montenegro, conducted revision of vaccine cards of children born in 2000, 2001 and 2002.

Vaccination, in Montenegro, is carried out in primary healthcare, in Counseling Services of Pediatrics Department in 21 municipalities or 42 vaccination points. Vaccination is not performing in the private sector. All childhood vaccines are free, purchased by the government.

Methods: As children mandatory to be vaccinated in 2002 were considered those born between 1.07.2001 and 1.07 2002. All registers of children born in 2000., 2001., 2002. were checked and as population mandatory to be vaccinated was considered children who have not been vaccinated according to vaccination schedule. In addition, Center for Epidemiology, Institute of Health of Montenegro has completed a sample study where delicate vaccine indicators have been considered. According to estimate of proportion, with the following parameters - 92% of vaccination coverage and significance level p = 0.01, sampling precision

E = 0.025 and out of total sample N = 8785 (number of persons mandatory to be vaccinated during previous year), Center for Statistics, Institute of Health of Montenegro selected sample of 730

persons what presented 8.2%. The sample was proportionally divided, based on the number of persons mandatory to be vaccinated, and the sample was selected with random method on each vaccination point.

As a delicate vaccine indicators were considered: percentage of children who started vaccination in time according to vaccination schedule, that is two months after birth; percentage of children who finished primary vaccination in time (3 doses), that is 7 months after birth according to vaccination schedule; for each vaccine, was monitored percentage of children mandatory to be vaccinated for year 2002 but were born in 2000 and 2001; percentage of BCG vaccine registered in vaccination card of a children vaccinated in Matrnity Department after birth; presence of permanent and temporary contraindications registered from the history card of children that are not regularily vaccinated or were not vaccinated.

RESULTS

The BCG vaccination coverage, that carried out immediately after birth in Maternity Department and during first year of life (in the case when there is no scar), was 95%. By municipalities this indicator ranged from 72% to 100%. The percentage of BCG vaccine recorded in vaccination card of each child was 73% at national level and it was ranged from 0% to 100%. (Chart I)

Vaccination against diphteria, tetanus and pertusisa (3 doses with DTP vaccine) was carried out with the coverage of 89% on national level. Per municipality the coverage ranged from the lowest one of 76% up to 100%. 92,3% of children got the first dose of DTP vaccine 2 months after birth what means on time according to vaccination schedule and only 81.8% were vaccinated in the predictive time, 7 months after birth according to vaccination schedule (table 2). In total, for the whole territory of Montenegro, 2.9% of children mandatory to be vaccinated in 2002 were those not vaccinated on time, born in 2000. By municipalities this indicator ranged from 0% to 9.4% (table 3).

The coverage of first DTP revaccination (one year after comletely carried out of primovaccination) was 87.8% at national level and it was ranged from 35.5% to 100% (table 4).

Pertusis revaccination coverage, at the age of 4 , was 84%, in Montenegro. Revaccination with vaccine against pertusis was canceled with vaccination schedule from year 2003 godine.

Diphteria and tetanus (DT) revaccination coverage, at the age of 7 years - before school enrolement, was 98% on the teritory of Republic of Montenegro.

OPV vaccination (3 doses) coverage was 89% at national level. By municipalities this coverage was ranged from 76% to 100%. 92.3% of children received the first dose of OPV vaccine 2 months after birth and 81.8% were vaccinated 7 months after birth. 2.9% of children mandatory to be vaccinated in 2002 were those not vaccinated on time, born in 2000. By municipalities this indicator ranged from 0% to 9.4% (table 2 and 3).

In Podgorica, capital of Montenegro, where live 26.2% of the whole poulation and which participates with 32% of all born in 2001, this indicator was 87.7% for first dose of OPV vaccine 3 months after birth and 71.4% for comletely carried out primary vaccination 7 months after birth. OPV primary vaccination coverage for Podgorica in 2002 was 95.6% (table5 and table 6).

The first OPV revaccination (one year after comleted primary vaccination) coverage was 87.8% and the second one, at the age of 7, that is before school enrolement was 98%. (table 4)

MMR vaccination coverage, at the age of 2, was 88.1% at national level. By municipalities the coverage was ranged from 71.4% to 100% (in smaller municipalities). According to vaccination schedule children at the age of one year are mandatory to receive MMR vaccine. In total, for the territory of Montenegro, 17.4% of children that should have been vaccinated in 2002 presented those born in 2000 (table 6).

Revising the vaccination card of children born in 2000, 2001 and 2002 and history cards of children who have not been regularly vaccinated, it was noted that involement of permanent contaraindications at national level and for all vaccines was 0.1% and involement of temporaray contaraindications was 2.7%.

DISCUSION

Escalating costs of curative medicine increase the importance of prevention in general, and vaccines in particular. The GAVI partners consider immunization to be key element of public health, a prerequisite to economic and social development and a crucial element in enabling every child to reach his|her full physical and intellecual potential (3).

Immunization presents both individual and collective protection measure. Risk for vaccinated persons to become ill is determined by stability and lasting of vaccine immunity. Risk for persons who have not been vaccinated to be exposed to infective agents and become ill, is determined by the level of collective immunity (5).

The immunization coverage is the most important element for establishing collective immunity. Differences in epidemiological situation of a vaccines preventable diseases in different geographical regions are the result of different vaccination coverage. Even in the cases of satisfied epidemiological situation, gaps in immunization delivery system and the decline in vaccination coverage of population is recognized as the risk for occurrence of wide epidemics.

Selection of the age at which a vaccine should be administered depends on the ability of the vaccinee to respond to the vaccine, the risk of exposure to disease, and the age distribution of disease morbidity. (4)

In the framework of the targets of the Global Alliance for Vaccines and Immunization, Montenegro changed the immunization schedule from 2003 (Table 7). The year of 2002 was used to identify gaps of immunization delivery system and improve accuracy of officially reported coverage rates of vaccination, precision and timelines at all levels.

The vaccination coverage rate is calculated as the number of vaccinated children divided by the number of children planned for vaccination. The denominator is calculated at municipality level. Also, in our indicator survey data was calculated only from a personal vaccination card. On that way it was not available other comparable survey in which beside vaccination card data were calculated on the basis of the mother's statement. On that way the results gained were lower than expected.

As there were not many persons mandatory to be vaccinated in Montenegro it was possible to revise all vaccine cards of children of indicated years of age. Due to changes in vaccination schedule we used delicate indicators to measure the performance of individual providers They provided diagnostic information on reasons for lower coverage in some vaccination points.

Changes in the vaccination schedule refer to elimination of whole-cell pertussis vaccine at the age of 4, elimination of BCG revaccination at the age of 10, and introduction of Hepatitis B and IPV vaccination for children who are vaccinated against poliomyelitis after 1 year of age.

According to new vaccination schedule BCG vaccination is carried out only once, immediately after birth in Maternity Department and in primary healthcare services in the case when there is no scar, without revaccination. Records in vaccination card in primary health care on received BCG vaccines was worse than real BCG vaccination coverage and with wide oscillations comparing 3 observed years.

OPV and DTP vaccination coverage is similar because these vaccines are administered simultaneously. The research showed that the most children (mandatory to be vaccinated) 92,35 received the first dose in predictive time according to vaccination schedule. The reasons why at least the same number of children were not completely vaccinated with 3 doses in predictive time are much clear now because they do not refer to permanent and temporary contraindications.

The permanent contraidications, in Montenegro, are presented only with one child (0.1%). One contraindication of MMR vaccine is registered and it is manifested as allergies on eggs. Temporary contraindications, which can cause decline in vaccination coverage during period of revising vaccine cards, are involved with 2.7%.

Comparing with other developed and developing countries of Mediterranean area, Montenegro vaccination coverage, by each vaccines, is mostly lower according to WHO/UNICEF Review of National Immunization Coverage (11).

For DTP i OPV vaccination we are, with 89%, under Italy (95%), Spain (95%), Slovenia (92%) but also Egypt with 99%. We are at the same level as The Former Yugoslav Republic of Macedonia and Bosnia and Herzegovina. Considering MMR (MCV, measles) vaccination with 88,1% we are still above Italy (70%) or on the same level as Germany (89%). But the question if we could compare this precise survey with traditional official report.

Because of announced changes in vaccination schedule for 2003, the monovalente pertussis vaccination coverage was lower than in previous years.

Good and bad sides of vaccine delivery system organization have been recognized as a significant element in achieving high percent of vaccination coverage among children. It was emphasized that the permanent working group and team work are the key elements of successful vaccination coverage. Individual engagement and willing to learn are also important for success.

It was shown, but it is not a rule, that smaller municipalities have better organization and the higher percent of coverage. It was not confirmed that municipalities with large number of vaccination points have the lower percent of vaccination coverage. Double vaccination evidence of a child has been recognized as a bad practice as it can cause unreal insight in vaccination status of every child. Double evidence is usually carried out in rural areas where there are not vaccination points.

CONCLUSION

The final goal of immunization is eradication and elimination of certain infectious diseases, and its direct goal is prevention of disease. One of the goals of the Global Alliance for Vaccines and Immunization is to increase rates of childhood vaccination to over 90 percent worldwide and to include in this coverage vaccines against hepatitis B and H. Influenzae type b infection (2).

Many aveliable strategies work to increase immunization. The value of a strategy depends upon its implementation, its potential effectiveness, and how well it is matched to existing problem (1)

Considering Montenegroo, we recognised advantages and disadvantages of our sistem,. strength and weakness in order to increase the immunization level and create lasting and effective immunization delivery system.

The small country followed with small number of the people are in advantage. In addition, the groups of the same people that perform immunization programme having the best picture of real situation in their communities, team work, willing to learn and improve their knowledge, introduction of computer system in immunization programs are recognised as advantages. Structure of our health sistem with a great number of the immunization points (comparing with teritory) are recognised as a disadvantage. Also unstable financial resources.

This summary points (lesons learnt) could provide tools which are usefull to improve immunization delivery system and to determinate future focus activities.

Activity plan mean progress toward achieving the immunization targets: strenghtening existing national immunization programmes, sufficient long-term funding, continuous education and increasing awereness of all immunization staff, enhance safe immunization, waste management, implementation of new and underused vaccines and other management issues.

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Table 1: Obligatory vaccination schedule for 2002 in Montenegro

AGE GROUPS	VACCINES			
At birth	BCG			
1 mounth				
2 mounth		DTP	Polio	
3,5 mounth		DTP	Polio	
5 mounth		DTP	Polio	
2 years		DTP	Polio	MMR
4 years		Pertussis		
7 years		DT	Polio	
10 years	BCG			
12 years				MMR
14 years		dT	Polio	
18 years		TT		

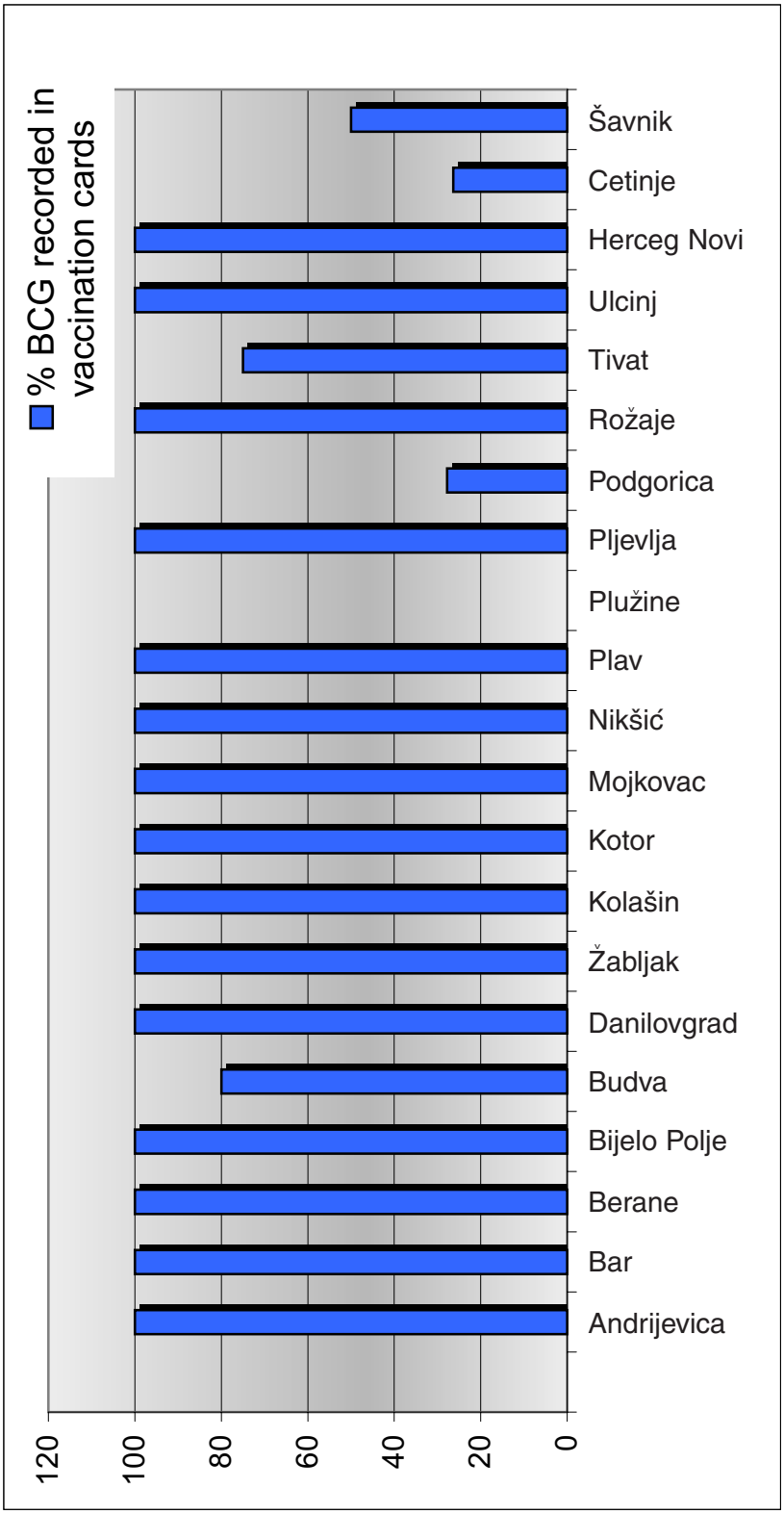

Chart I: The percentage of BCG vaccine recorded in vaccination card of children in primary health care

Table 2: Percentage of children that received 3 doses DTP/OPV on time according immunization schedule

MUNICIPALITY	Sample sutvey		DTP1 i OPV1 (in 3 mounth)	% DTP1 i OPV1	DTP 3 / OPV3			
	No	%			Vaccinated on time until 7 mounth	% vaccinated on time until 7 mounth	Vaccinated on time within one year	% vaccinated on time within one year
Andrijevica	7	8,2	7	100.0	7	100.0	0	100.0
Bar	39	8,2	39	100.0	35	89.7	3	97.4
Berane	42	8,2	39	92.9	24	57.1	16	98.1
Bijelo Polje	58	8.2	58	100.0	55	94.8	3	100.0
Budva	20	8,2	13	65.0	14	70.0	5	95.0
Danilovgrad	17	8,2	15	88.2	15	88.2	0	88.2
Žabljak	3	8.2	3	100.0	3	100.0	0	100.0
Kolašin	9	8.2	9	100.0	9	100.0	0	100.0
Kotor	22	8.2	22	100.0	21	95.5	1	100.0
Mojkovac	11	8.2	11	100.0	11	100.0	0	100.0
Nikšić	83	8.2	83	100.0	76	91.6	5	97.6
Plav	20	8.2	19	95.0	18	90.0	2	100.0
Plužine	10	8.2	8	80.0	6	60.0	2	100.0
Pljevlja	34	8.2	29	85.3	29	85.3	2	92.2
Podgorica	227	8.2	199	87.7	162	71.4	55	99.0
Rožaje	37	8.2	37	100.0	35	94.6	2	100.0
Tivat	16	8.2	16	100.0	15	93.8	1	100.0
Ulcinj	24	8.2	22	91.7	20	83.3	0	83.3
Herceg Novi	30	8.2	27	90.0	26	86.7	1	90.4
Cetinje	19	8.2	16	84.2	15	78.9	1	85.2
Šavnik	2	8.2	2	100.0	1	50.0	0	50.0
TOTAL	730	8.2	674	**92.3**	597	**81.8**	99	96.5

Table 3: Children mandatory to be vaccinated by years for DTP/OPV primary vaccinaton

Municipality DTP 3 & OPV 3	Children mandatory to be vaccinated							vaccinated							Percentage %
	2002	%*	2001	%*	2000	%*	In total	2002	% !	2001	% !	2000	% !	In total	
Andrijevica	71	100.0	0	0.0	0	0.0	71	71	100.0	0	0.0	0	0.0	71	100.0
Bar	431	100.0	0	0.0	0	0.0	431	381	88.4	0	0.0	0	0.0	381	88.4
Berane	281	50.4	227	40.7	50	9.0	558	222	79.0	198	87.2	11	22.0	431	77.2
Bijelo Polje	354	50.0	349	49.3	5	0.7	708	341	96.3	345	98.9	5	100.0	691	97.6
Budva	101	41.6	123	50.6	19	7.8	243	73	72.3	108	87.8	4	21.1	185	76.1
Danilovgrad	176	100.0	0	0.0	0	0.0	176	151	85.8	0	0.0	0	0.0	151	85.8
Zabljak	17	36.2	30	63.8	0	0.0	47	14	82.4	30	100.0	0	0.0	44	93.6
Kolasin	92	73.0	34	27.0	0	0.0	126	91	98.9	33	97.1	0	0.0	124	98.4
Kotor	95	44.2	111	51.6	9	4.2	215	87	91.6	107	96.4	7	77.8	201	93.5
Mojkovac	41	32.0	87	68.0	0	0.0	128	41	100.0	86	98.9	0	0.0	127	99.2
Niksic	498	48.3	511	49.5	23	2.2	1032	437	87.8	492	96.3	18	78.3	947	91.8
Plav	111	52.4	99	46.7	2	0.9	212	103	92.8	99	100.0	2	100.0	204	96.2
Pluzine	19	38.0	29	58.0	2	4.0	50	16	84.2	28	96.6	2	100.0	46	92.0
Pljevlja	181	47.3	198	51.7	4	1.0	383	168	92.8	189	95.5	4	100.0	361	94.3
Podgorica	1054	39.0	1550	57.3	99	3.7	2703	806	76.5	1459	94.1	68	68.7	2333	86.3
Rozaje	453	100.0	0	0.0	0	0.0	453	443	97.8	0	0.0	0	0.0	443	97.8
Tivat	88	47.6	90	48.6	7	3.8	185	75	85.2	84	93.3	7	100.0	166	89.7
Ulcinj	120	44.9	143	53.6	4	1.5	267	89	74.2	131	91.6	2	50.0	222	83.1
Herceg Novi	161	40.8	225	57.0	9	2.3	395	134	83.2	202	89.8	4	44.4	340	86.1
Cetinje	76	44.4	79	46.2	16	9.4	171	61	80.3	71	89.9	11	68.8	143	83.6
Savnik	11	44.0	14	56.0	0	0.0	25	7	63.6	14	100.0	0	0.0	21	84.0
TOTAL	**4431**	**51.6**	**3899**	**45.4**	**249**	**2.9**	**8579**	**3811**	**86.0**	**3676**	**94.3**	**145**	**58.2**	**7632**	**89.0**

* pecentage from all children mandatory to be vaccinated

! percentage of children mandatory to be vaccinated from the same year

Table 4: Children mandatory to be vaccinated by years for DTP and OPV vaccination

Municipality DTP R1 & OPV R1	DTP R1 & OPV R1 children mandatory to be vaccinated					DTP R1 & OPV R1 vaccinated					Percentage (%)
	2001	**%***	**2000**	**%***	**total**	**2001**	**% !**	**2000**	**% !**	**total**	
Andrijevica	81	100.0	0	0.0	81	80	98.8	0	0	80	98.8
Bar	171	36.6	296	63.4	467	139	81.3	251	84.8	390	83.5
Berane	149	34.8	279	65.2	428	121	81.2	234	83.9	355	82.9
Bijelo Polje	314	46.4	363	53.6	677	310	98.7	361	99.4	671	99.1
Budva	76	30.5	173	69.5	249	47	61.8	130	75.1	177	71.1
Danilovgrad	70	39.3	108	60.7	178	63	90.0	99	91.7	162	91.0
Zabljak	8	25.0	24	75.0	32	8	100.0	23	95.8	31	96.9
Kolasin	44	45.4	53	54.6	97	43	97.7	52	98.1	95	97.9
Kotor	82	36.3	144	63.7	226	62	75.6	113	78.5	175	77.4
Mojkovac	131	100.0	0	0.0	131	131	100.0	0	0	131	100.0
Niksic	370	39.0	579	61.0	949	312	84.3	515	88.9	827	87.1
Plav	72	37.3	121	62.7	193	72	100.0	121	100.0	193	100.0
Pluzine	9	22.5	31	77.5	40	9	100.0	31	100.0	40	100.0
Pljevlja	150	37.3	252	62.7	402	143	95.3	237	94.0	380	94.5
Podgorica	670	29.3	1619	70.7	2289	556	83.0	1452	89.7	2008	87.7
Rozaje	440	100.0	0	0.0	440	436	99.1	0	0	436	99.1
Tivat	76	41.5	107	58.5	183	66	86.8	104	97.2	170	92.9
Ulcinj	84	35.1	155	64.9	239	72	85.7	147	94.8	219	91.6
Herceg Novi	105	26.9	286	73.1	391	87	82.9	227	79.4	314	80.3
Cetinje	62	33.2	125	66.8	187	54	87.1	12	9.6	66	35.3
Savnik	3	15.8	16	84.2	19	3	100.0	14	87.5	17	89.5
TOTAL	**3167**	**40.1**	**4731**	**59.9**	**7898**	**2814**	**88.9**	**4123**	**87.1**	**6937**	87.8

* percentage from all children mandatory to be vaccinated

! percentage of children mandatory to be vaccinated from the same year

Table 5: Percentage of children that received 3 doses DTP/OPV on time according immunization schedule for Podgorica (capital of Montenego) in total and by all vaccination points within Podgorica

Municipality	Sample survey		DTP1 i OPV1 (in 3th mounth)	% DTP1 i OPV1 (in 3th mounth)	DTP 3 / OPV3 vaccinated				
	No	%			on time until 7 mounth	% on time until 7 mounth	on time within one year	% on time within one year	Total within one year
Podgorica UKUPNO	**227**	**8.2**	**199**	**87.7**	**162**	**71.4**	**55**	**24.2**	**95.6**
Blok 5	65	8.2	59	90.8	48	73.8	14	21.5	95.3
Nova Varoš	49	8.2	47	95.9	40	81.6	8	16.3	97.9
Pobrežje	43	8.2	31	72.1	22	51.2	18	41.9	93.1
Zagorič	12	8.2	12	100.0	9	75.0	3	25.0	100
Tuzi	15	8.2	11	73.3	8	53.3	7	46.7	100
Golubovci	19	8.2	16	84.2	16	84.2	2	10.5	94.7
Konik	24	8.2	23	95.8	19	79.2	3	12.5	91.7

Table 6: Children mandatory to be vaccinated by years for DTP3 / OPV3 for Podgorica in total and for all vaccination points

Municipality	Children mandatory to be vaccinated							vaccinated							Percentage
DTP 3	2002	%*	2001	%*	2000	%*	total	2002	% !	2001	% !	2000	% !	total	(%)
Podgorica total	1054	39.0	1550	57.3	99	**3.7**	2703	806	76.5	1459	94.1	68	**68.7**	2333	86.3
Blok 5	293	38.7	441	58.3	23	3.0	757	227	77.5	432	98.0	21	91.3	680	89.8
Nova Varos	194	36.5	323	60.8	14	2.6	531	167	86.1	311	96.3	9	64.3	487	91.7
Konik	117	38.5	163	53.6	24	7.9	304	68	58.1	132	81.0	5	20.8	205	67.4
Pobrezje	229	41.1	306	54.9	22	3.9	557	154	67.2	284	92.8	19	86.4	457	82.0
Zagoric	67	37.2	109	60.6	4	2.2	180	59	88.1	100	91.7	4	100.0	163	90.5
Tuzi	78	46.7	84	50.3	5	3.0	167	71	91.0	83	98.8	5	100.0	159	95.2
Golubovci	76	36.7	124	59.9	7	3.4	207	60	78.9	117	94.4	5	71.4	182	87.9

Table 7: Children mandatory to be vaccinated by years for measles, mumps, rubella vaccine for 2002

MUNICIPALITY	**MMR children for vaccination 2002**	MMMR children born in 2001	% of child. born in 2001 for 2002	MMR children born in 2000	% child. born in 2000 for 2002	**MMR vaccinated in 2002**	**% MMR vaccinated in 2002**	MMR vaccinated from 2001	% MMR vaccinated from 2001	MMR vaccinated from 2000	% MMR vaccinated from 2000
Andrijevica	**77**	77	100.0	0	0.0	**77**	**100.0**	77	100.0	0	0.0
Bar	**488**	397	81.4	91	18.6	**420**	**86.1**	356	89.7	64	70.3
Berane	**532**	379	71.2	153	28.8	**380**	**71.4**	288	76.0	92	60.1
Bijelo Polje	**684**	650	95.0	34	5.0	**681**	**99.6**	647	99.5	34	100.0
Budva	**262**	186	71.0	76	29.0	**203**	**77.5**	147	79.0	56	73.7
Danilovgrad	**197**	168	85.3	29	14.7	**171**	**86.8**	152	90.5	19	65.5
Zabljak	**43**	43	100.0	0	0.0	**42**	**97.7**	42	97.7	0	0.0
Kolašin	**88**	76	86.4	12	13.6	**87**	**98.9**	75	98.7	12	100.0
Kotor	**276**	200	72.5	76	27.5	**224**	**81.2**	162	81.0	62	81.6
Mojkovac	**135**	135	100.0	0	0.0	**133**	**98.5**	133	98.5	0	0.0
Nikšić	**1024**	817	79.8	207	20.2	**888**	**86.7**	710	86.9	178	86.0
Plav	**174**	165	94.8	9	5.2	**172**	**98.9**	163	98.8	9	100.0
Plužine	**44**	35	79.5	9	20.5	**44**	**100.0**	35	100.0	9	100.0
Pljevlja	**383**	345	90.1	38	9.9	**370**	**96.6**	332	96.2	38	100.0
Podgorica	**2680**	2168	80.9	512	19.1	**2295**	**85.6**	1871	86.3	424	82.8
Rožaje	**476**	476	100.0	0	0.0	**472**	**99.2**	472	99.2	0	0.0
Tivat	**205**	164	80.0	41	20.0	**196**	**95.6**	157	95.7	39	95.1
Ulcinj	**272**	234	86.0	38	14.0	**243**	**89.3**	209	89.3	34	89.5
Herceg Novi	**370**	281	75.9	89	24.1	**327**	**88.4**	259	92.2	68	76.4
Cetinje	**221**	135	61.1	86	38.9	**179**	**81.0**	109	80.7	70	81.4
Šavnik	**21**	17	81.0	4	19.0	**20**	**95.2**	16	94.1	4	100.0
TOTAL	**8652**	7148	82.6	1504	17.4	**7624**	**88.1**	6412	89.7	1212	80.6

Table 8: Immunization schedule for 2003 in Montenegro

AGE GROUPS	VACCINES					
At birth	BCG					Hep. B* HBsAg+
1 mounth						Hep. B* HBsAg+
2 mounth		DTP	Polio*		Hep. B	Hep. B* HBsAg+
3,5 mounth		DTP	Polio		Hep. B	
5 mounth		DTP	Polio			
2 years		DTP	Polio	MMR	Hep. B	Hep. B* HBsAg+
7 years		DT	Polio			
12 years				MMR		
14 years		dT	Polio			
18 years		TT				

* Current vaccination schedule for Montenegro relying only on OPV.
IPV is reccomanded for the children that have to receive the first dose of vaccine after one year old.

Pneumocystis jirovecii, one of the most frequent child infections: identifying the reservoir

E. Dei-Cas*, M. Chabé*, N. Respaldiza**, L. Delhaes*, D. Camus* and I. Durand-Joly*

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Present impact of *Pneumocystis* infection in humans - 1

- *Pneumocystis* Pneumonia (PcP) is a major infection of deeply immunocompromised patients
- Seroconversion : > 80% immunocompetent 2-4-year-old children
- *Pneumocystis* infection: one of the most frequent infections faced by humans in everyday life

Pifer et al, Pediatrics 61: 35-41,1978
Peglow et al, J Infect Dis 161:296-06, 1990
Wakefield et al, Trans R Soc Trop Med Hyg 84: 800-2,1990

Present impact of *Pneumocystis* infection in humans - 2

- *Pneumocystis* primary infection: probably an underdiagnosed respiratory disease in immunocompetent infants
- *Pneumocystis* cysts were detected in lungs from SIDS patients

Vargas et al, Clin Infect Dis 1999, 29, 1489-93

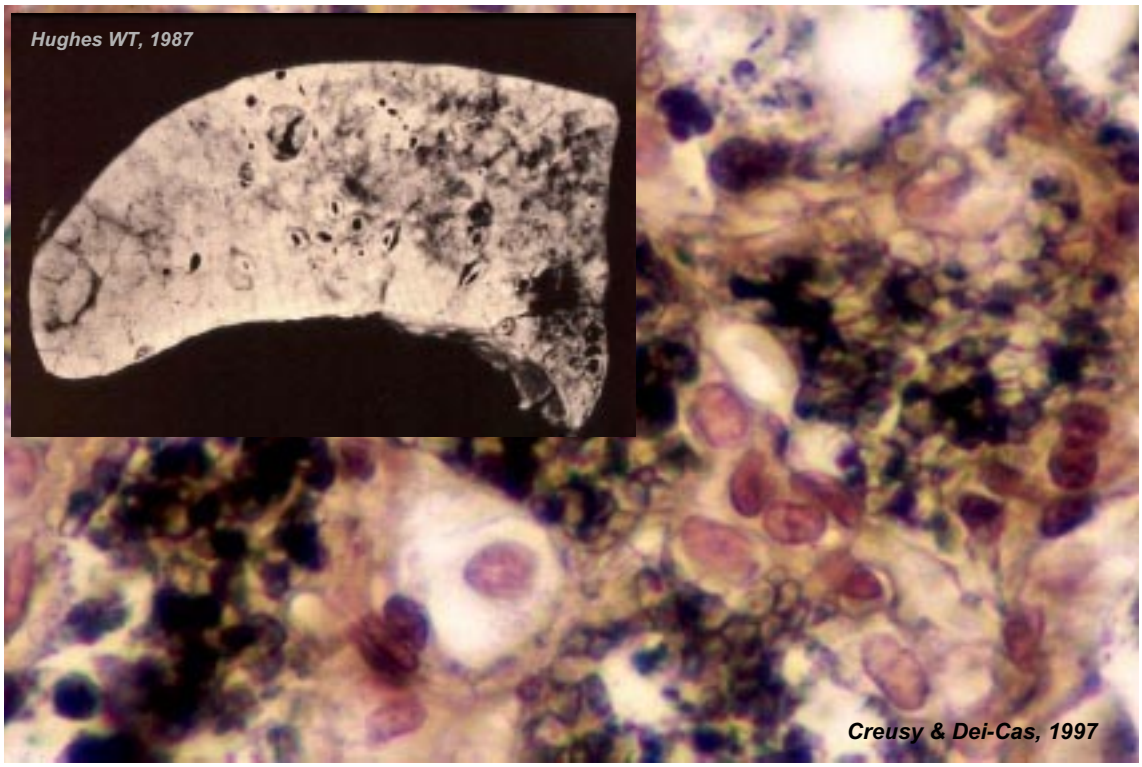
- *Pneumocystis* cysts or DNA was found in patients with chronic respiratory diseases

Several reports, see Dei-Cas E, 2000, Med Mycol 38 Suppl 1: 23-32 for review

Clinical forms of *Pneumocystis* pneumonia (PcP) in infants

	Plasma cell pneumonia	PcP of HIV-negative immunodepressed infants	PcP of HIV + infants
Epidemiologic form	Epidemic	Sporadic	Sporadic
Clinical context	Prematurity, malnutrition	HIV-negative, immunodeficiency	AIDS
Age	2 – 3 months	0 – 4 years	3 – 6 months
Onset	Gradual	Sudden	Gradual
Clinical presentation			
Fever	-	+	+
Tachypnea	+	+	+
Dry cough	-	+	+
Cyanosis	periorbital, circumoral	Yes	Yes
Mortality (untreated cases)	25 %	100 %	100 %

Walzer PD 1994 'Pneumocystis carinii Pneumonia' M Dekker, New York (modified)



Potential implication of *Pneumocystis* in SIDS

- *Pneumocystis* cysts were detected in lungs from :
  - 31% of 134 cases of Sudden Infant Death Syndrome (SIDS) in Chile
  - 15% of 27 SIDS patients in Oxford (UK)
  - 3% of 342 infants deceased from other causes

Vargas et al, Clin Infect Dis 1999, 29, 1489-93

- Nested PCR + direct sequencing identified two *P. jirovecii* genotypes (A and C) in SIDS patients

Chabé et al, 2004, Microbiology (in press)

P. jirovecii in Infants with Bronchiolitis (Amiens, France)

Pneumocystis mtLSU rRNA nested PCR on nasopharyngeal aspirate samples from infants of 4.7 months (2 – 12 months)

Pneumocystis jirovecii	10
RSV + *P. jirovecii*	8
Bacteria* + *P. jirovecii*	10
Bacteria* + RSV+ *P. jirovecii*	17
Total	45 / 178 (24.3%)

* *Bordetella pertussis* (1), *Branhamella catarrhalis* (9), *Haemophilus influenzae* (9), *Streptococcus pneumoniae* (3), *Klebsiella pnaumoniae* (1)

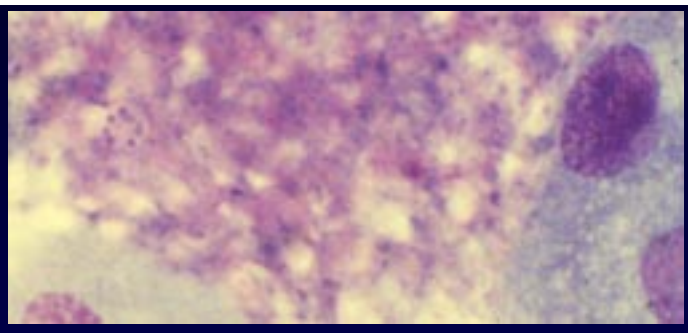
Nevez et al, J Euk Microbiol 2001, 48(Suppl), 122-3

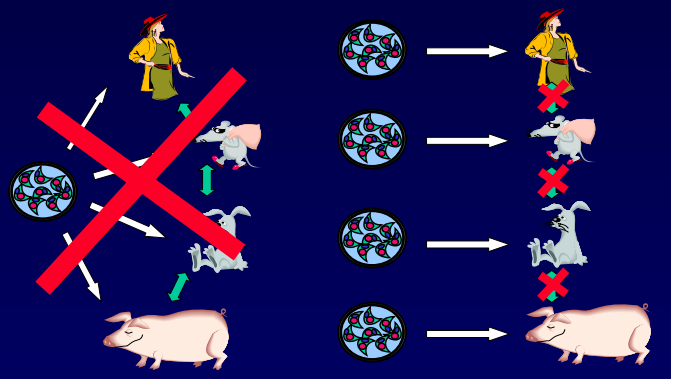
Human *Pneumocystis* Infection

Dei-Cas E, 2000, Med Mycol 38 Suppl 1: 23-32

Pneumocystis organisms :

- are found in the lung of mammals
- heterogeneous eukaryotic group assigned to the Fungal Kingdom
- similar morphology at the light microscopy level
- *P. carinii* Delanoë and Delanoë 1912 – unique species recognized in the past
- today, multiple species were recognized in diverse mammals
- *P. jirovecii* Frenkel 1999, sole species identified in humans





Aliouat et al, 1993, J Protozool Res 3: 94-8; Mazars et al, 1995. J Euk Microbiol 42: 26-32; Mazars et al, 1997. J Infect Dis 175: 655-60; Denis et al, 1998. J Euk Microbiol 45: 475-83; Denis et al, 2000. Med Mycol 38: 289-300; Durand-Joly et al, 2001. Med Mycol 38: 61-72; Durand-Joly et al. 2002. J Clin Microbiol 40: 1862-5.

Pneumocystis Transmission

- Airborne route

  Hughes, 1987
  Soulez et al, 1991
  Dumoulin et al, 2000
  Chabé et al, 2003

- One day-exposure is enough for transmission

  Soulez et al, 1991
  Ceré et al, 1997
  Dumoulin et al, 2000
  Chabé et al, 2003

- Infection is usually exogenous (no latent forms)

  Millard and Heryet, 1988
  Peters et al, 1992

- Transmission is host-species specific

  Aliouat et al, 1993
  Aliouat et al, 1994
  Gigliotti et al, 1993
  Durand-Joly et al, 2002

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