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EPIDEMIOLOGY LENSES : A PRESENTATION

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The presentation started with his nostalgic memory with Professor NR Mehta, Professor DH Trivedi and Professor AK Niyogi with whom he had the opportunity to work as a student and then as a colleague. He refreshed his memory as warden of Dr. Jivraj Mehta Hall where his predecessors were Prof NR Mehta and Professor DH Trivedi and he remembered to be the first time examiner with Prof. Niyogi who was examiner with him for the last time in his career

He also fondly remembered his nostalgic memory for Rajkot where he was borne and brought us and done his primary schooling.

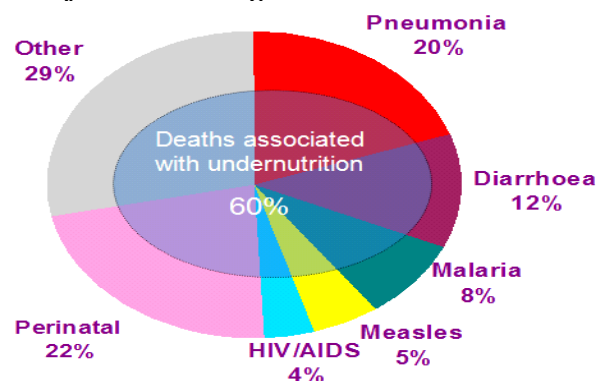
He then explained why he choose “Epidemiological lenses” as the subject for his oration that distinguishes the discipline from other disciplines and adds real value to the expertise of the subject. He mentioned that he would give certain example of ways to look at the data critically and would look forward to interactions from the members

Child Mortality & Nutrition

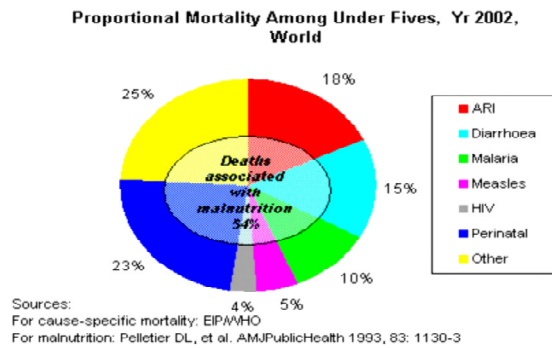
- **Of total 9.2 million children dying under five every year globally (update from 10.5 million), India contributes to nearly 2 million (21%)**

This amounts to 5480 children in India everyday dyeing and that amounts to be nearly 4 children under five years of age every minute, three of them are likely to be infants

Major Causes of Death among Children around the World



He began with presentation global data on child mortality and disproportionately large contribution by India towards child death. These figures do not make any sensation; however using pocket calculator when the data were converted in to deaths per minute in India, it made all the difference to the audience and they could perceive the sensation. He mentioned that it is always useful to understand the audience and make best use of the data that appeals the audience the way they perceive the data



Quoting the reliable reference from EIP/WHO he then stressed that under nutrition was accounting for 60% of total deaths in children and still it was not visible clearly. So if malnutrition was to be controlled, deaths would reduce by 60%.

He further pointed out that while the total deaths did not change in number, contribution of the under-nutrition for total death declined from 60% to 54% and this is not by intervention but by better application of model.

He then paused a question, what sort of epidemiological data would answer, “what proportion of total deaths can be attributed to under nutrition?” He then explained the difficulties of data interpretation that everyone would like to have a simplified way of presentation.

However these data are generated from complex models and that has potential limitations. So data needs to be reviewed more critically and recommended to keep up sense of critical review to the data always on.

NEW BORN DEATHS : VADODARA

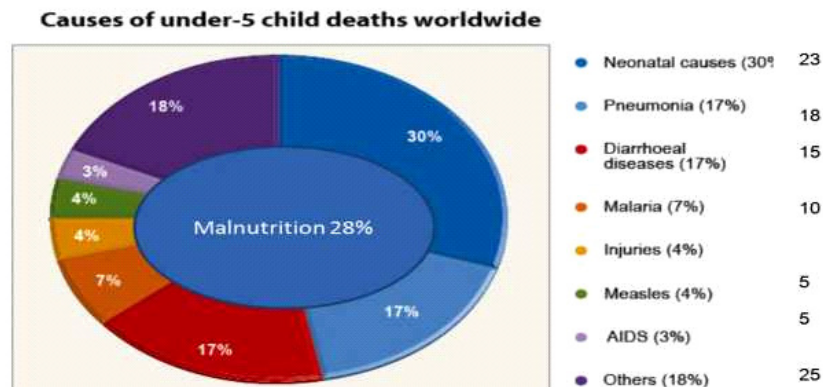
	DAY	U-5 CHILD DEATHS
594	BY 7TH DAY	29%
974	BY 28TH DAY	48%
1570	BY 1 YEAR	78%
2014	BY 5 YEARS	100%

NEW BORN DEATHS : INDIA

Day	U5 Child deaths
1st day	20%
By 3rd day	25%
By 7th day	37%
By 28th day	50%

Of the total deaths under five years of age, more than half were occurring in less than one month of age. He then questioned that if this is true and if malnutrition sets in after six months of age, how is that possible that it is underlying cause for over 50% of child mortality? He doubted the model and critically followed the data for some years

WHO world health statistics 2009



He could demonstrate that the doubt in his mind turned out to be true and the refined model now has been more realistically claiming only 28% of the child deaths under five attributed to malnutrition. This was as shown in earlier slide was at 60%. This is not shift in time, since total deaths continued to be around 9-10 million deaths. Skepticism followed scientifically and with the background knowledge that epidemiology pays rich dividends

Then he went to another area for critically using his epidemiology lenses for vitamin A related data. WHO in 1998 quoted to reduce deaths from measles by 50% and overall mortality by 25% with vitamin A supplementation. He mentioned that while training for biannual rounds most of the department staff used these data provided by WHO in the good faith of child survival actions. How would Vitamin A reduce deaths? The explanations included improved immunity, particularly for mucus membrane and so less chances of infection and so less ARI and diarrhea and so less deaths due to these diseases. He again mentioned the possible difficulties in quantifying the deaths.

Improving the Vitamin-A status of children:

A) Increases their chances of survival:

- **Reduces death from measles by 50 %**
- **Reduces death from diarrhoea by 40 %**
- **Reduces overall mortality by 25 %.**

(WHO 1998)

B) Reduces the severity of childhood illnesses:

- **Less strain on clinic and outpatient services**
- **Fewer hospital admissions**
- **Contributes to the well-being of children and families.**

Assumptions in this hypothesis

- **Population is deficit in Vitamin A level**
- **Diet is not able to provide adequate vitamin A**
- **Hygiene is poor and therefore risk of diarrhea and infection is high**
- **Diarrhea and infection contributes to child mortality to reasonably large extent**

Lancet Paper MCH Undernutrition

- **Vitamin A supplementation in children 6-59 months reduced child mortality by 24% from pooled studies (RR=0.76 with CI 0.69-0.84)**
- **It did not show any effect on morbidity from infectious diseases**
- **A pooled analysis of studies from south Asia showed reduction of 21% for children less than six months with neonatal VAS (RR=0.76 with CI 0.65-0.96)**

He noticed some thing unusual about the inferences drawn in the Lancet series of article which mentioned that while child mortality was reduced by 24%, there was no reduction of child morbidity. His earlier assumptions shown in the previous slide did not match the findings and found that this issue needs to be flagged for consideration and further discussion
Wide variation of reduction in mortality and pointed out that some studies in Inida did not show any reduction at all and 24% reduction was derived from pooling of eight trials from different countries and different level of factors which he referred to as underlying assumptions

Community-based randomised and/or placebo-controlled trials of vitamin A (1986-93): deaths

Year & Country	Author	RR	95% CI
1986, Indonesia	Sommer,	0.66	0.44-0.97
1990, India	Vijayaragavan,	1.0	0.65-1.55
1990,India	Ramathulla,	0.46	0.30-0.71
1990, Nepal	West,	0.70	0.56-0.88
1992, Nepal	Daulaire,	0.74	0.55-0.99
1992, Sudan	Herrera,	1.06	0.82-1.37
1992, Ghana	Arthur	0.30	0.12-0.75
1993, Ghana	Vast	0.81	0.68-0.98
1986-93	EIGHT Trials	0.77	0.70-0.85

He then gave the background of a huge study done in Uttar Pradesh State of India that covered more children than all the studies done prior to this study

Six-monthly vitamin A from 1 to 6 years of age

DEVTA: cluster-randomised trial in 1 million children in North India

DEVTA: cluster-randomised trial 8000+ villages in 72 clusters

36 blocks **36 blocks allocated open CONTROL**
6-monthly **Also, visit all villages 6 monthly to get mortality**
VITAMIN A **(25,000 child deaths recorded)**
DEVTA: mortality results (ages 1-6)
Mean probability that a 1.0-year-old would die by age 6.0 years,
36 vit A vs 36 control blocks:
24.9 vs 26.0 per 1000
2p = 0.24, not significant
(comparing 36 vs 36 blocks)

study noted both morbidity and mortality and also had a randomized controlled design. The study design had inherent flaws but overall study had strengths and weaknesses both that he highlighted. No difference in morbidity and mortality with vitamin A supplementation in this study done longitudinally for five years covering 10 lakh children and over 25000 child deaths follow up

Interpretation was simple accepting the study protocol without doubts: Vitamin A did not reduce morbidity or mortality among young children according to this study.

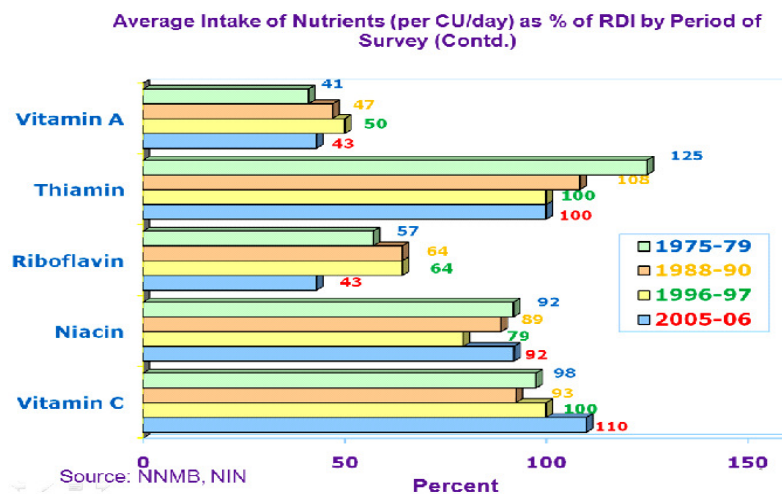
DEVTA Study Interpretation

- **A large study involving more than 1 million children, a follow up for five years showed that VAS does not decrease morbidity and mortality among children 6-59 months in Uttar Pradesh, India**
- **Study did not show any significant change in morbidity of infectious diseases**

He then posed the question that in the background of this study and WHO recommendation, should India continue to provide vitamin A to young children. The answer to question by most of the delegates present was that ‘probably not’

What is Vitamin A National program’s objective?

At any stage in India, program runs to control vitamin A deficiency and not to reduce child mortality. That, if true is an added benefit. But the program is to control clinical and subclinical vitamin A deficiency. Does that exist?



DEVTA:

vit A vs control mortality ratio, RR = 0.96 (99% CI 0.88-1.05)

- Should we continue Vitamin A supplementation in the community if evidence for the child survival claimed is doubtful from recent and large set of data from India...?

Last 25 years of data from National Nutrition Monitoring bureau (NNMB) from NIN that vitamin A intake has been consistently less than 50% of RDA for over 25 years and we have not been able to improve in take !

So it is then realized that data of child survival relate issue should not distract us from the main focus of the program with which it was initiated.

Idea of giving this example is to keep our mind open, have a rationale approach, understand the public health importance, not get governed by sentiments and come to logical, data based, public interest focused decision making in the community as epidemiology experts !

The fact remains that Vitamin A supplementation helped in reducing vitamin A deficiency.

Distribution (%) of 1- 5 Yr. Children with Blood Vit. A Levels of < 20 µg/dL, Median Dietary Intake of Vit. A (as % RDA) and Extent of Coverage for Suppl. of Massive Dose Vit. A – By State

STATES	Blood Vitamin A < 20 µg/dL	Dietary Intake of Vitamin A < 50% of RDA	Receipt of Massive Dose Vitamin A		
			1 or 2 Doses	No. of Doses	
				One	Two
Kerala	79.4	91.8	38.5	28.4	10.1
Tamil Nadu	48.8	81.9	50.6	20.2	30.4
Karnataka	52.1	90.4	56.6	42.1	14.5
AP	61.5	92.9	49.3	14.2	35.1
Maharashtra	54.7	88.8	52.1	29.4	22.7
MP	88.0	87.4	52.3	19.1	33.2
Orissa	57.7	77.5	80.0	38.8	41.2
West Bengal	61.2	80.6	50.6	46.8	3.8
Pooled	61.8	86.3	55.4	30.3	25.1

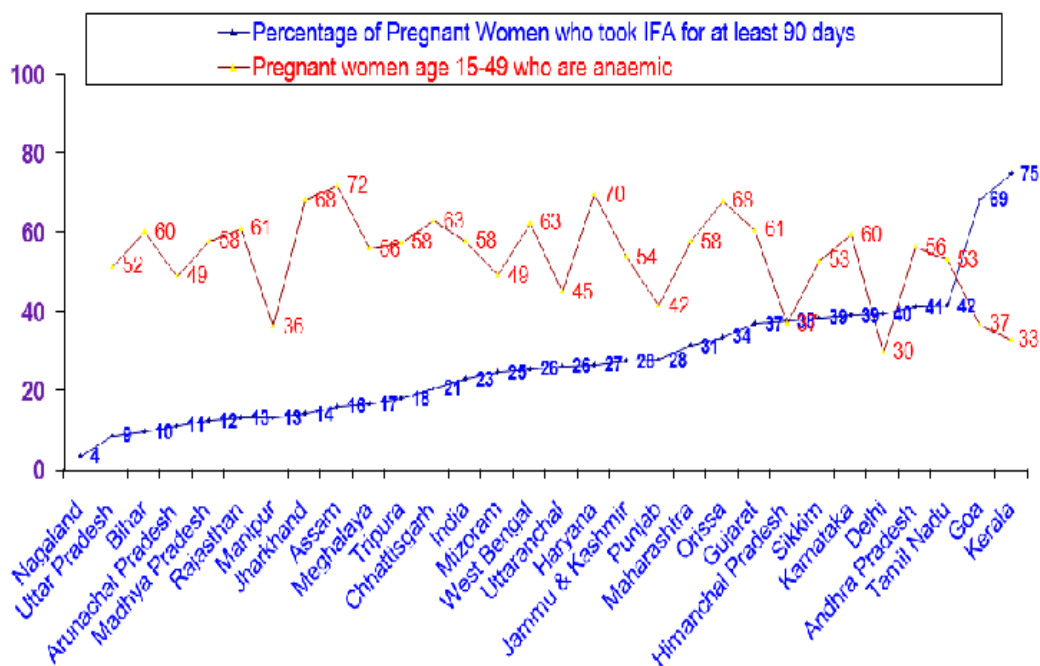
simple logical approach is control of anemia in pregnancy.

Anemia in Pregnancy

- **Iron deficiency is the main cause**
- **Adequate ANC (3 ANC) and proper IFA supplementation (90/100 IFA) will reduce anemia in pregnancy**

If IFA supplementation coverage is better anemia should be less. Data from four countries failed to show such relationship and despite wide variation of 0-37% IFA coverage, anemia was high all through four countries

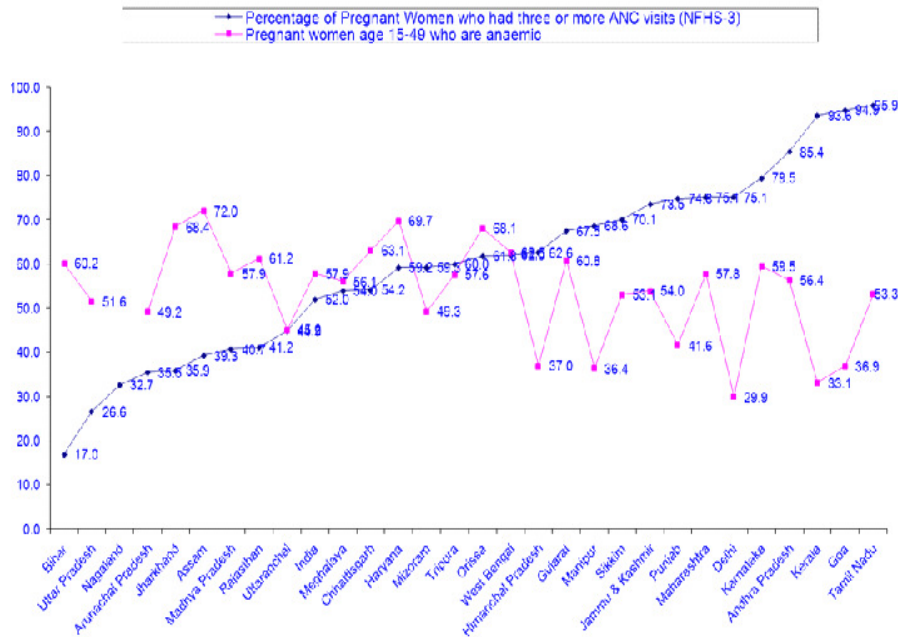
INDIA NFHS III: Anemia Vs IFAS



It could be because of different countries and different data source. He used NFHS III data and for all the states of India. IFA supplementation data failed to show relationship with anemia prevalence.

Similar expected ANC coverage and anemia prevalence also failed to show relationship. He asked the possible explanations for not being able to see what looked most logical. One can review this with epidemiology lenses.

INDIA NFHS III: Anemia Vs 3 ANC



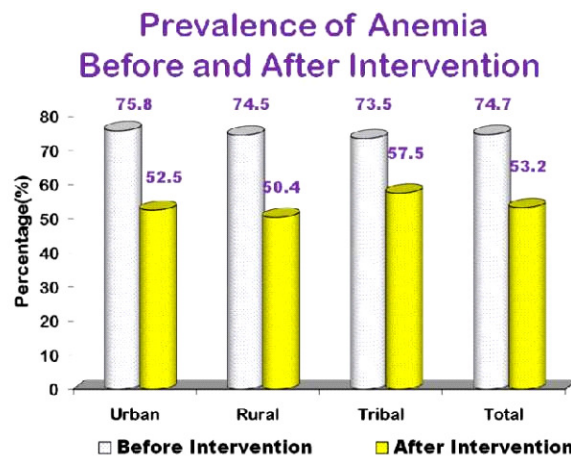
program

Ived. The

Research Data

- With UNICEF support we launched adolescent girls anemia control program in Vadodra district for school going girls
- Intervention was IFA supplementation once a weekly targeting to reduce iron deficiency anemia

Program rated as successful and scaled up to entire Gujarat State now covering 1 million + girls



He used epidemiology lenses, and becoming devil's advocate and asked why only 23% reduction? Why not more? Is this suggesting success?

He explained then the difference in anemia reduction against iron deficiency anemia prevalence reduction. Since we do not have the data to quantify proportion or iron deficiency By these simple and logical and familiar data and going beyond data, he encouraged young students and faculty to utilize epidemiology skills as best as possible. This is one expertise that differentiates PSM experts from others.

He, then differentiated between knowledge and information. Use of skepticism and use of epidemiology skills skill he strongly recommended and called them as "epidemiology lenses"

Philosophy of Epidemiology

- **Information is not knowledge**
- **Information used with correct judgment and epidemiological skills is...**
- **Skepticism is preferred in epidemiology**
- **Epidemiology lenses give you insight to the data.**
- **We need epidemiology skills and rationale and logical thinking to combine with the observed data.**
- **PSM Experts HAVE this expertise**

Applied Epidemiology

Knowing is not enough; We must apply....

Willingness is not enough; We must do.....

Epidemiology Knowledge is Power

- **Knowledge can potentially generate arrogance**
- **Position can also generate arrogance**
- **Vidya vinaya thi shobhe**
- **Let us all**
 - **Contribute to science and society**
 - **Be polite and friendly to our colleagues and students always....**

While stressing the importance of epidemiology in particular and overall knowledge in general, he called the knowledge as power. He recommended to improve further and making oneself knowledgeable, he suggested politely to senior staff to not become 'arrogant' with this knowledge.

He mentioned the importance of remaining humble and open and approachable to all the community at large as public health person and to the students and staff always as a senior teacher. As public health persons, as technical experts, we are accountable to the community and we need to contribute to the science and society for improving the scenario for good.
