

# Rationale, challenges and opportunities for multi-sector approaches to reduce anemia



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# A Few Anemia “Basics”



- “Anemia”--lack of blood (Greek)
- ↓ in normal Red Blood Cells or low Hemoglobin (Hb)
- Hemoglobin (Hb) binds to oxygen and carries it to tissues
- RBCs consist mostly of Hb.
- Hb not sensitive or specific for iron deficiency

# A Few Iron Basics



- Iron deficiency one of the most common forms of malnutrition and its burden falls mainly on women and children
- Iron is essential to all cells and organ systems but is also toxic if present in its free forms
- Human body has developed finely tuned systems for the regulation of iron absorption, metabolism, and excretion

# A Few More Iron Basics



- Humans have evolved mechanisms (via hepciden) to reduce iron availability to pathogens.
- Malaria & pathogenic bacteria need iron to survive & multiply.

# Problem is massive... Rate of improvement is very slow!

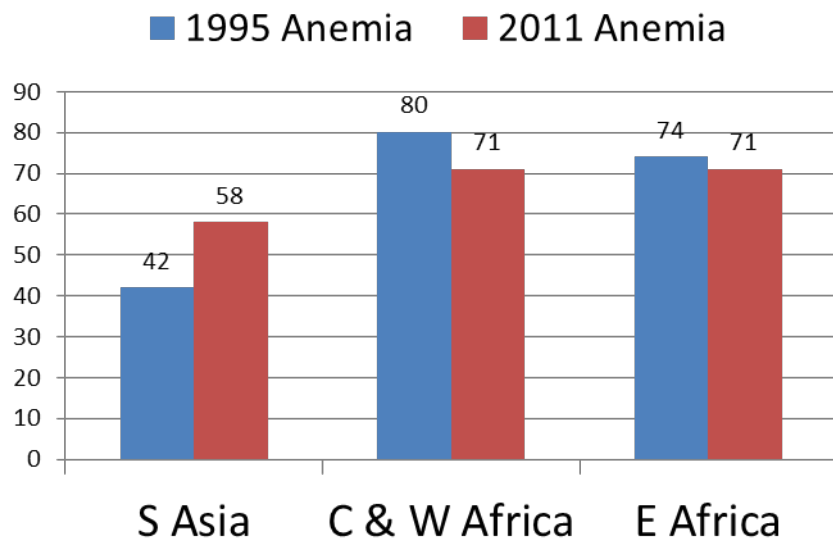


800 million people, ~30% of women, ~43% children <5y

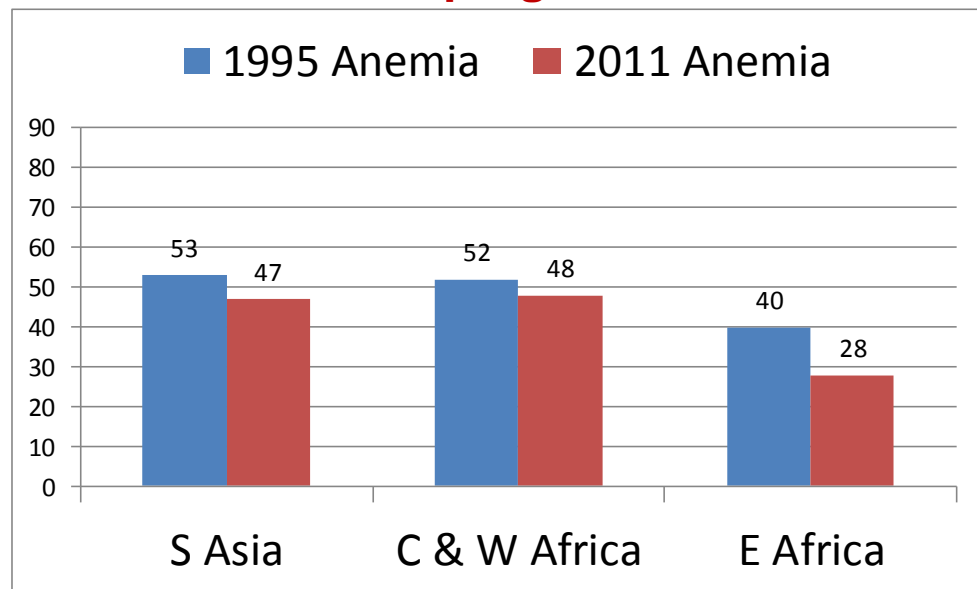
0.2%-0.3% reduction per year

>100 yrs S Asia, >150 yrs in C & W Africa

**Children <5 yr**



**Non-pregnant**



# New Scientific Evidence



- Decreased risk of maternal mortality (Black et al, Lancet, 2013)
- Decreased risk of very pre-term births & early neonatal mortality (Zeng L, BMJ 2008; Titatley, 2009)
- Improved birth weight and reduced incidence of low birth weight (Christian P; BMJ, 2003; Pena-Rosas, JP et al Cochrane review 2013)
- Reduced mortality among Nepalese children by 31% between birth & 7 years (Christian P; Am J Epidemiol, 2009)
- IFA + IPTp in mothers associated with 24% ↓ in neonatal deaths 19 countries Sub-Saharan Africa (Titaley CR et al, AJCN, 2010)



Not all anemia is caused by iron deficiency. But iron deficiency is a major cause of anemia in many developing countries.



Other vitamin deficiencies  
(B12, Vit A, Folate)

Malaria

HIV/AIDS

Anemia

Iron Def  
Anemia

Iron Def

Hemoglobin-  
opathies

Inflammatory  
Conditions

Hookworm

Poor dietary  
availability &  
intake & high  
physiologic  
need

# Overlapping causes of Anemia



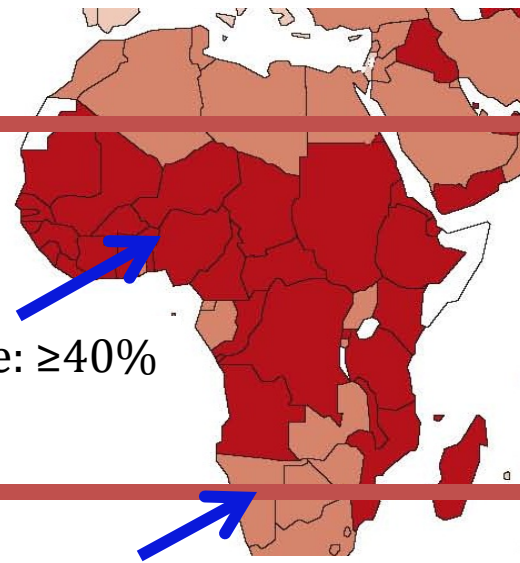
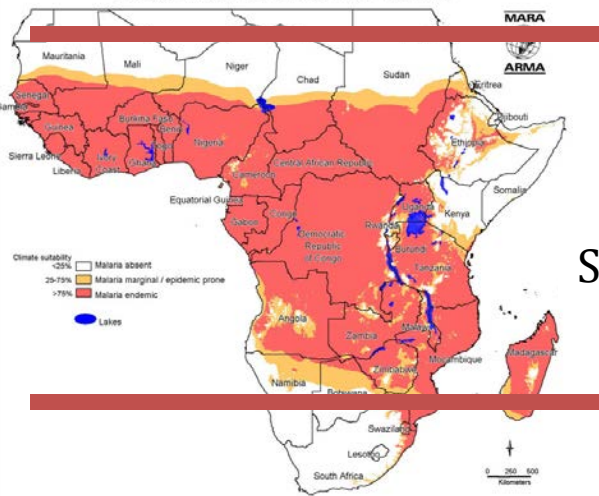
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## Malaria

## Anemia

## Hookworm

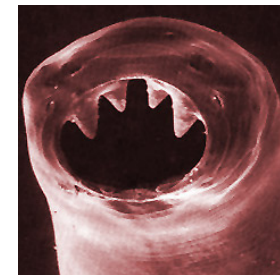
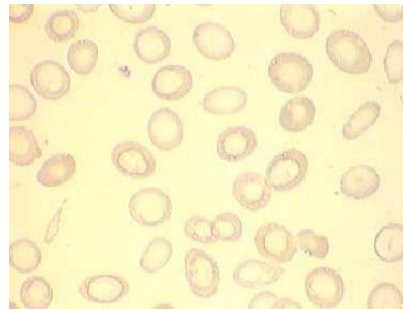
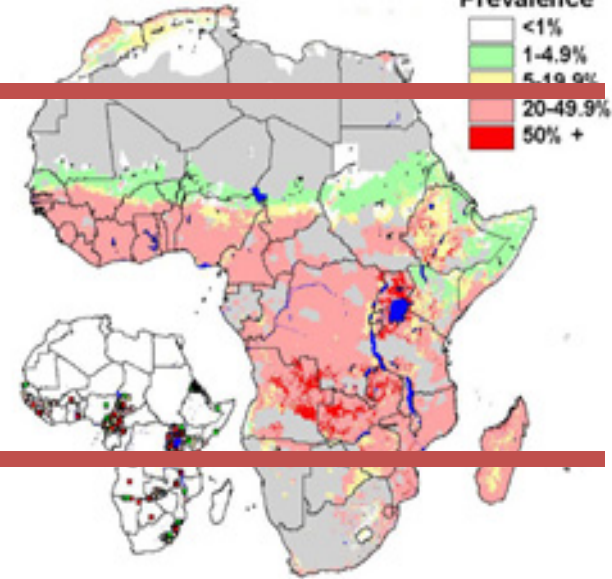
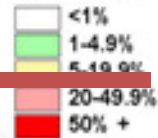
Distribution of Endemic Malaria



Severe:  $\geq 40\%$

Moderate: 20-39%

Prevalence



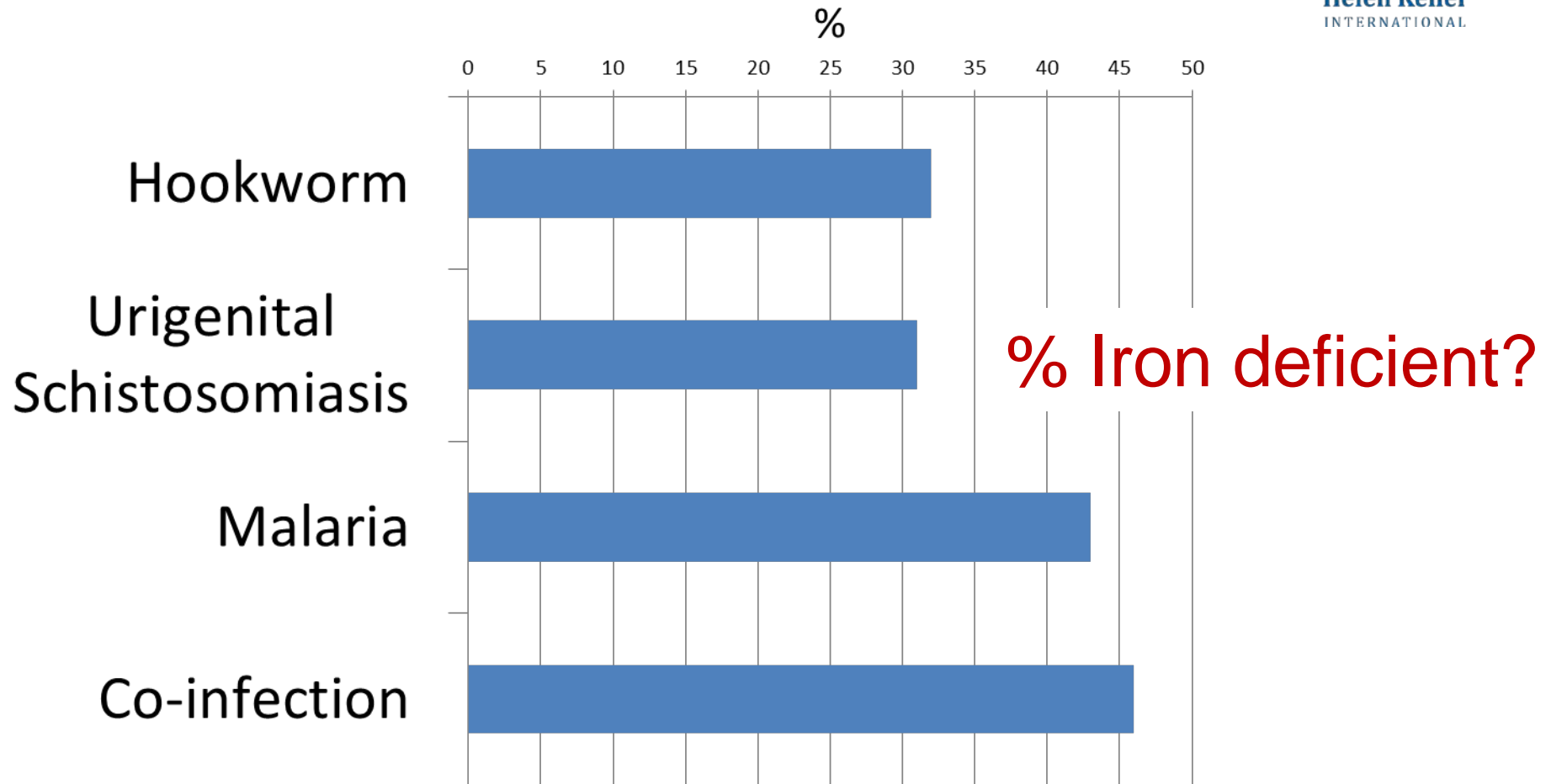
This map is a product of the MARA/ARMA collaboration (<http://www.mara.org.za>). July 2001. Medical Research Council, PO Box 17120, Congella, 4013, Durban, South Africa  
CORE FUNDERS of MARA/ARMA: International Development Research Centre, Canada (IDRC); The Wellcome Trust UK; South African Medical Research Council (SAMRC); Swiss Tropical Institute, Multilateral Initiative on Malaria (MI2) / Special Programme for Research & Training in Tropical Diseases (STR), Roll Back Malaria (RBM).  
Malaria distribution model: Craig, M.H. et al. 1999. Parasitology Today 15: 105-111.  
Topographical data: African Data Sampler, WRI. [http://www.igis.org/infodiv/hsp/infodivdata\\_sds.htm](http://www.igis.org/infodiv/hsp/infodivdata_sds.htm)



# Parasitic infection in pregnancy, coastal Kenya, 2000-05



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Fairley JK et al, Am J Trop Med Hyg, 2013

# Causes of anemia should drive intervention package



Possible Causes	Interventions
Iron deficiency?	Iron supplementation, Fortification, Improved dietary intake, delayed cord clamping (at birth)
Other hematinic vitamin deficiencies?	Vitamin supplementation, improved dietary intake, Fortification
Malaria?	Intermittent Preventive Treatment (IPT), Bednets, Residual spraying
Hookworm?	Deworming (Albendazole, Mebendazole), Hygiene
Schistosomiasis?	Praziquantel Treatment
Other infections?	Water & Sanitation, Prevention & Treatment
Hemoglobinopathies?	

# Causes of anemia should drive intervention package



Possible Causes	Interventions
Iron deficiency	Improved (at birth)
Other deficiencies	etary
Malaria	),
Hookworm	),
	Hygiene
Schistosomiasis?	Praziquantel Treatment
Other infections?	Water & Sanitation, Prevention & Treatment
Hemoglobinopathies?	

**Intervention choice must address the underlying cause(s) of anemia**

# Intervention mix should be tailored to anemia risk over the life course



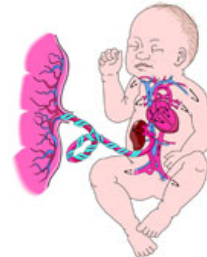
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Adolescent



WRA &  
Pregnant



Neonates



Infants &  
children

- ↑ iron intake
- Deworming
- LLINs for malaria
- Delayed age at first pregnancy
- Prolonged inter-pregnancy interval

- Iron+folic acid or Multiple Micronutrient supplementation
- Deworming
- IPT & LLINs for malaria

- Delayed cord clamping
- Early & exclusive breast feeding

- Exclusive breast feeding
- ↑ iron intake (MNPs, LNS, fortified foods)
- LLINs
- IPTi
- Dx & Rx of malaria

WRA-Women of Reproductive Age  
LLINs-long-lasting insecticide nets  
IPT-Intermittent preventive treatment  
MNPs-Micronutrient powders  
Dx-diagnosis  
Rx-Treatment

# Engage sectors & activate platforms with high probability of delivering “effective” intervention coverage at scale



<b>Interventions</b>	<b>Target Groups</b>	<b>Sectors</b>	<b>Platforms</b>
IFA supple'n (daily)	Pregnant	Health Services, Community	ANC, CHWs
IFA supplementation (weekly)	Adolescents	Education	Schools
	Preconceptional	Health Services, Community	ANC,
	Menstruating	Private	Markets
Home-based fortification (powders)	Children (6-59 m)	Health Services, Community, Private	ANC, Community Groups, Market
	Pregnant women		
Fortified supplementary food	Pregnant	Health Services, Community	Child Health Days, Community Promotion, Markets
	Children (6-59 m)	Private	



# Engage sectors & activate platforms with high probability of delivering “effective” intervention coverage at scale



<b>Interventions</b>	<b>Target Groups</b>	<b>Sector</b>	<b>Platforms</b>
Malaria prev & control	Households	Health Services, Community	ANC, CHWs, Bednet distributors, Residual sprayers
Deworming	Pregnant, Children 6-59	Health Services, Community	ANC, CHWs
Delayed cord clamping	At birth	Health Services	Institutional deliveries
Staple food fortification	All	Private, Food Regulation	Market
Increase iron intake thru diet	Pre-conceptual	Health Services, Agricultural Extension, Community, Private	ANC, CHD,
	Pregnant		
	Children (6-59 m)		

# Engage sectors & activate platforms with high probability of delivering “effective” intervention coverage at scale



<b>Interventions</b>	<b>Target Groups</b>	<b>Sector</b>	<b>Platforms</b>
Delayed pregnancy	Adolescent girls	Education, Family Planning, Community	Schools, others
Birth spacing	Women of reproductive age	Health services, Family Planning, Community	ANC, others

# Implementation Challenges



- Inadequate political
- Low priority for IFA within maternal health programs
- Insufficient bundling of interventions to address the multiple causes of anemia
- Inadequate supplies, low utilization, and weak demand
- Convincing evidence of effectiveness is lacking
- Community-based delivery platforms to complement the ANC platform are missing

# Need to Link Anemia Reduction to Broader Agendas & Sectors



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Development &  
Poverty Reduction

Agriculture & WASH

Health &  
Family Planning

Nutrition

Anemia

# Need to Link Anemia Reduction to Broader Agendas & Sectors



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Development &  
Poverty Reduction

World Health Assembly Goal: 50%  
reduction in anemia by 2025

Health &  
Family Planning

A key Feed the Future Indicator

Anemia



# Moving Forward: Challenges to Effective Implementation- 1



- IFA is “on the books”, but lacks adequate political support. **Need to link consequences of anemia to broader dev’t goals.**
- Low priority for IFA within maternal health programs even while IPTp ramped up. **Need to examine & address causes.**

# Comparison of current performance and anticipated standard of focused ANC model, Tanzania



## Tanzania

### First Visit

### Re-visit

	Current Practice (minutes)	Desired based on FANC (minutes)	Current Practice (minutes)	Desired based on FANC (minutes)
Registration	2:10	5:00	1:30	0:00
History taking	4:20	10:00	1:20	5:00
Examination	3:30	8:00	3:00	8:00
Drug Administration	1:00	3:00	1:40	3:00
Immunization	1:40	1:00	1:00	1:00
<b>Health education &amp; counseling</b>	<b>1:30</b>	<b>15:00</b>	<b>0:00</b>	<b>15:00</b>
Total time direct activities	12:20	42:00	6:30	32:00
Welcoming the client	1:00	1:00	1:00	1:00
Documentation of findings	2:00	3:00	1:30	3:00
<b>Total contact time</b>	<b>15:20</b>	<b>46:00</b>	<b>9:00</b>	<b>36:00</b>

# Moving Forward: Challenges to Effective Implementation-2



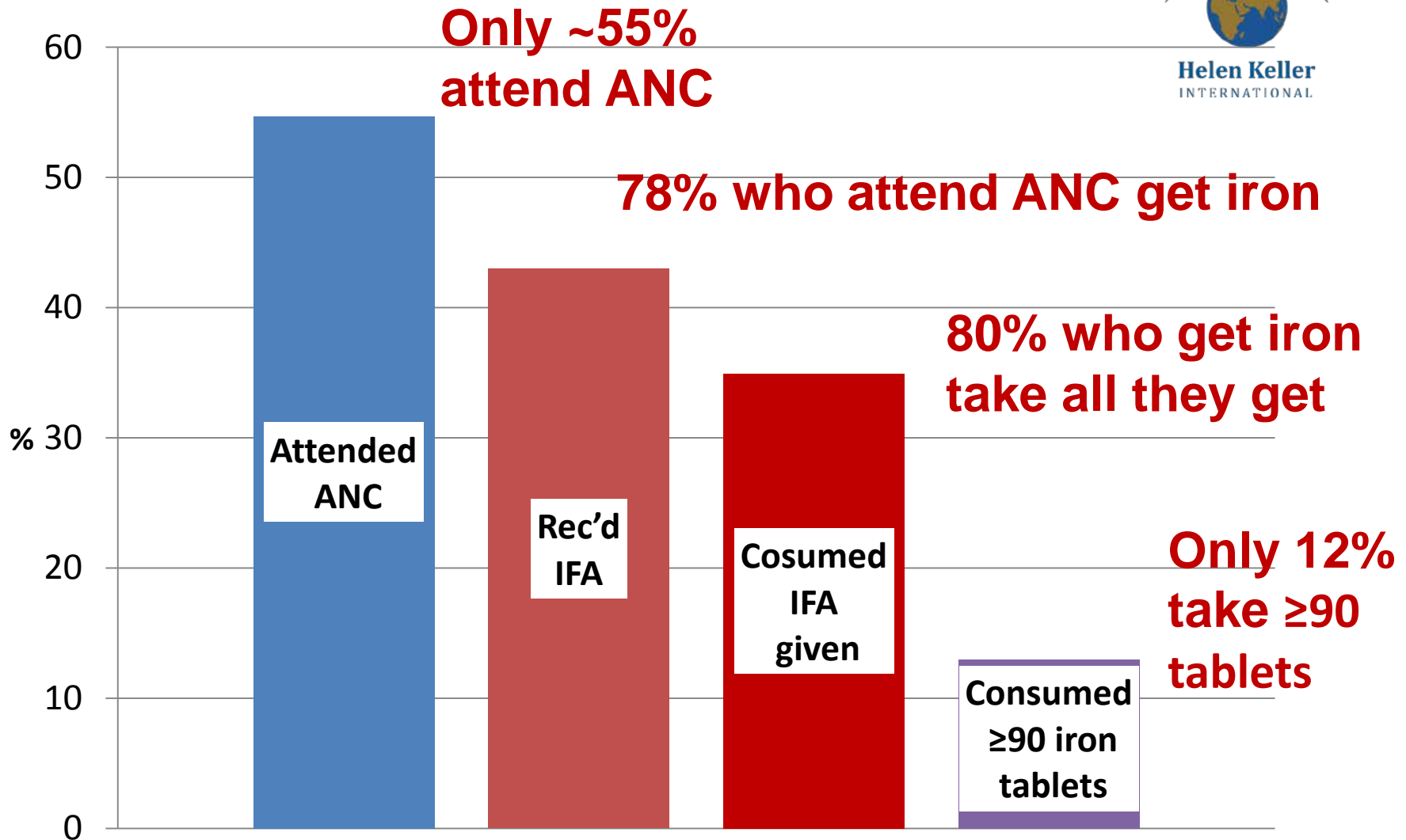
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- Insufficient bundling of interventions to address the multiple causes of anemia. **Bundling essential to maximize benefits & minimize risks.**
- Inadequate supplies, low utilization, and weak demand. **Need to ask, assess, act.**

# Use of iron tablets by ANC attendees in Jharkhand, India, 2008 n=955



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# Moving Forward: Challenges to Effective Implementation-3



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- Community-based delivery platforms to complement the ANC platform are missing. **Need to find complementary delivery strategies that bring services closer to home (e.g. community-based volunteers, private sector outlets combined with social marketing)**



# Right cause(s) + Right delivery=SUCCESS



Intervention addresses  
appropriate cause(s) or problem?

Intervention(s)  
delivered to those  
at risk?  
(Implementation  
Fidelity)

	Yes	No
Yes	Program Success	Causal Logic Program
No	Implementation Problem	Program Failure

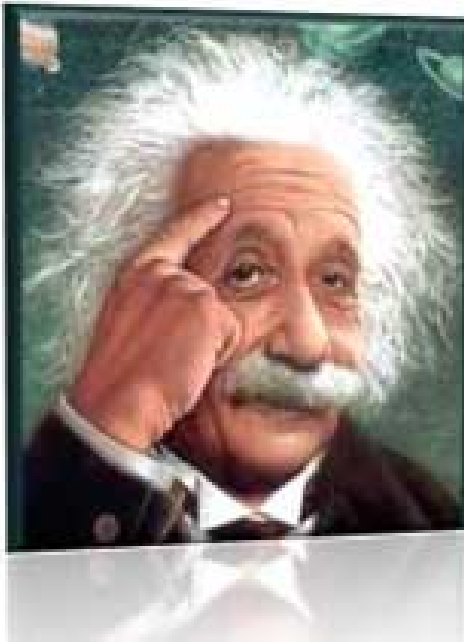
# Summary



- Anemia problem is massive & reduction has been slow
- Strong observational and a growing body causal evidence of consequences and benefits of reducing anemia
- Causes of anemia should drive intervention package
- Intervention mix should be tailored to anemia risk over the life course
- Engage sectors & activate platforms with high probability of delivering “effecting” intervention coverage at scale



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***Insanity is doing the same thing, over and over again, but expecting different results ~ Albert Einstein***



Thank you