Effectiveness of Zinc in the prevention and treatment of childhood diarrhea

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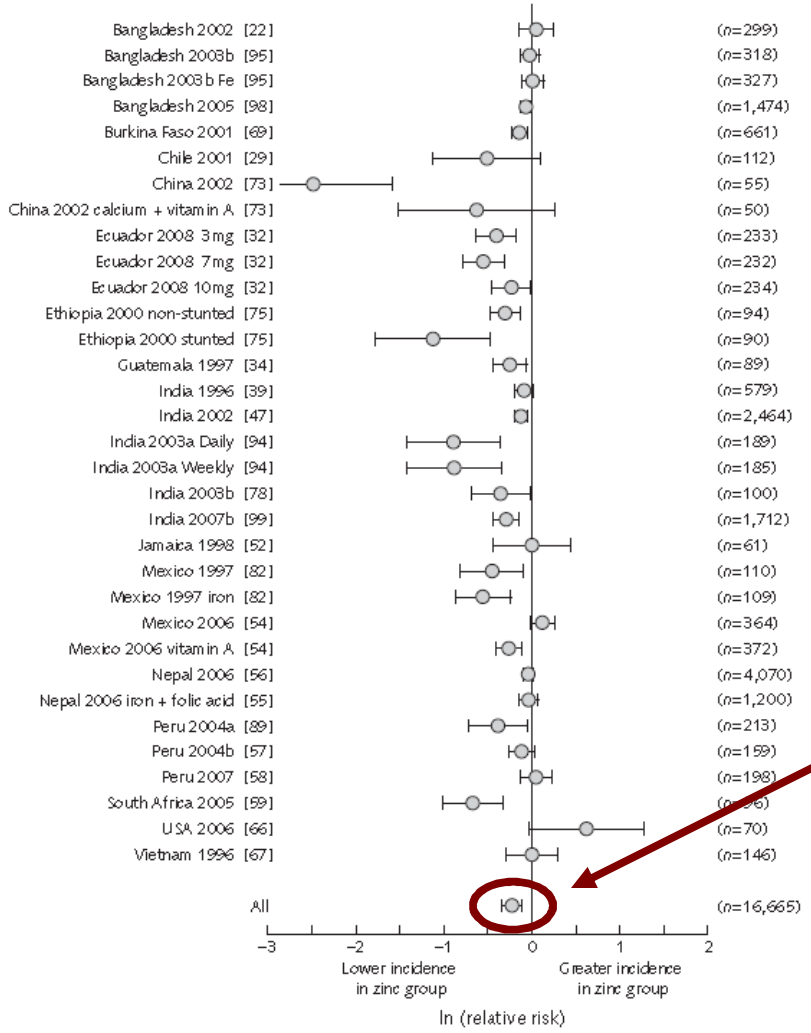
Effect of zinc supplementation on diarrhea incidence (n = 33 comparisons; 16,665 children)

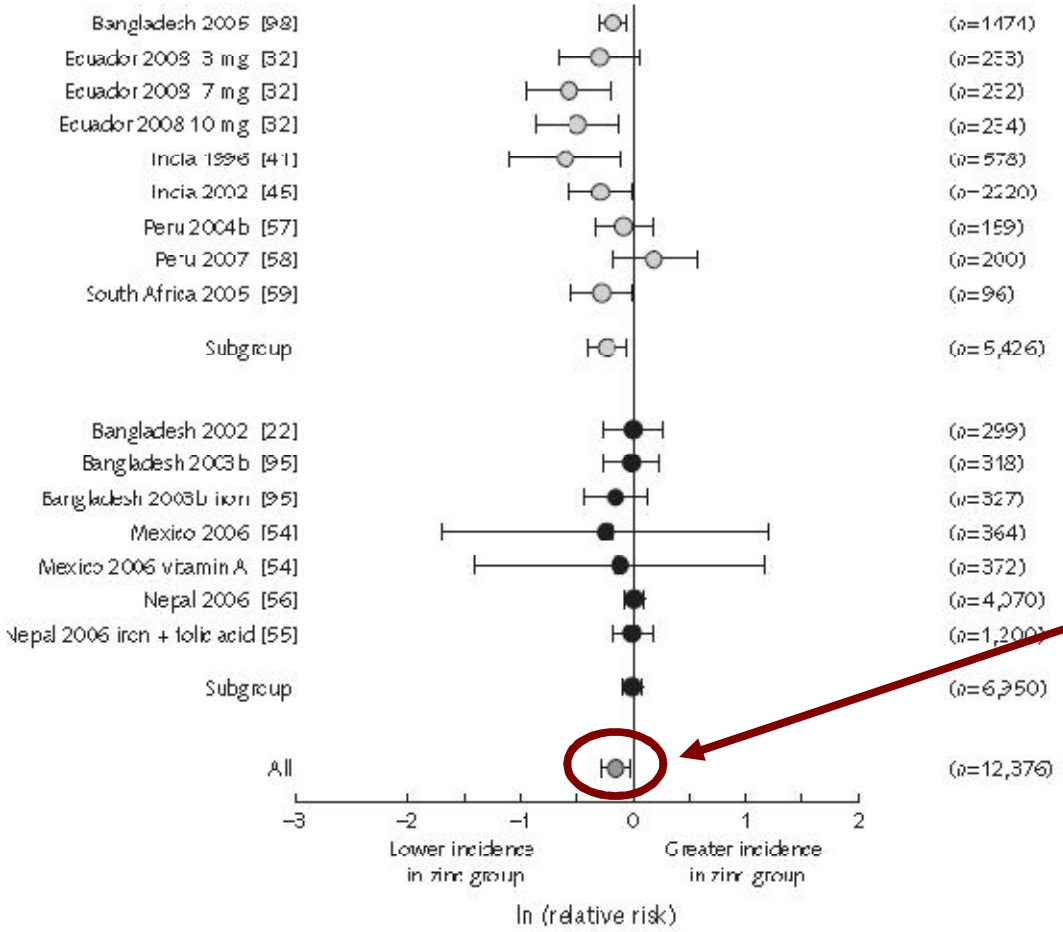


Zinc supplementation produced a 20% reduction in overall diarrhea incidence

RR = 0.80 (0.61,0.87)
p=0.0004

Heterogeneity: age (+); nutritional status (-); serum ferritin (+)

Effect of zinc supplementation on incidence of ALRI (n = 16 comparisons; 12,376 children)



Zinc supplementation produced a 15% reduction in overall incidence of ALRI

RR = 0.85 (0.75, 0.97)

p=0.017

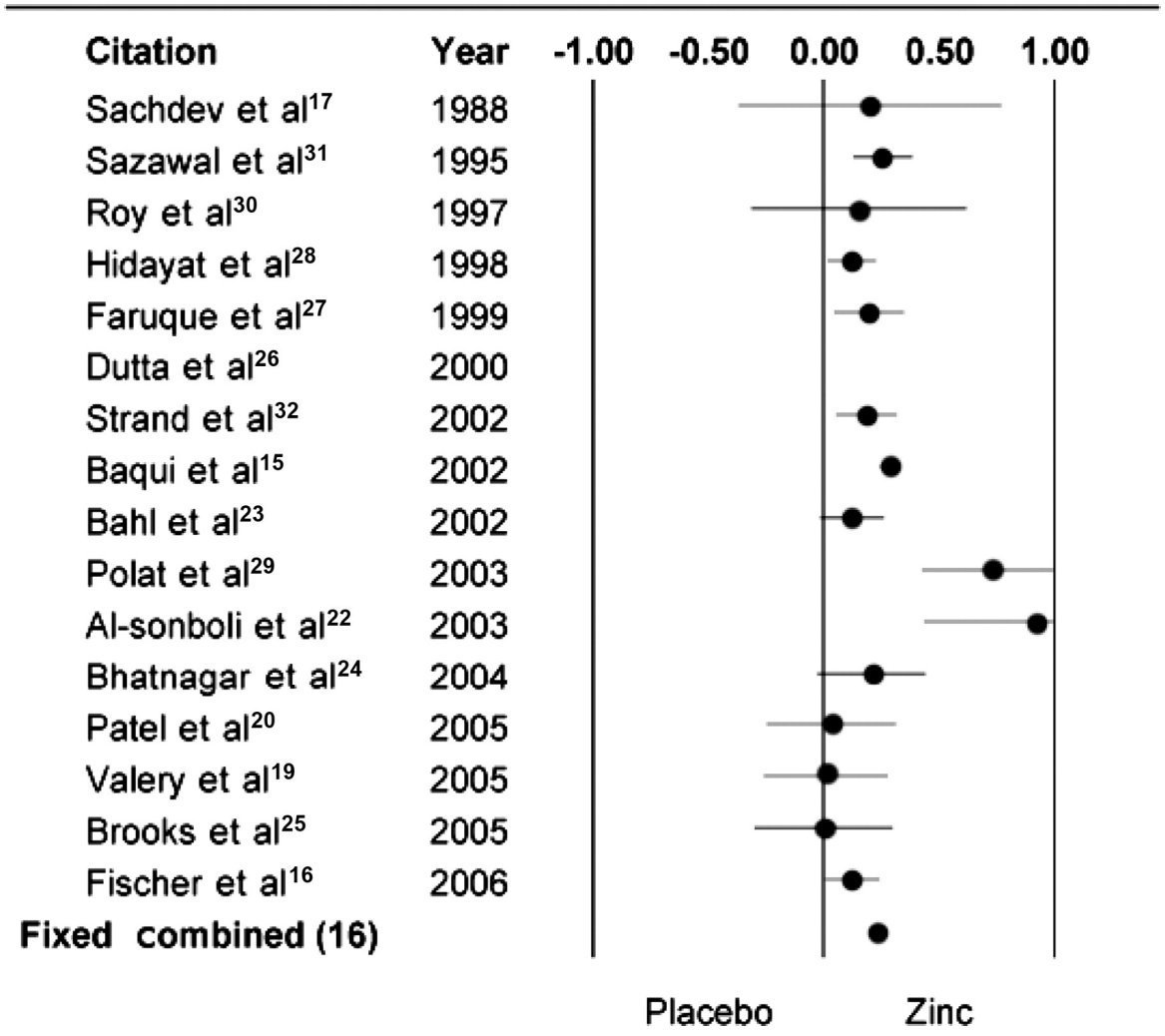
Heterogeneity: nutritional status (-); quality of dx (+)

Trials on the Therapeutic Effect of Zinc on Acute Diarrhea

- **Countries: Australia, Bangladesh (4), Brazil, India (6), Indonesia, Nepal, Turkey, Multi-country**
- **Age groups: 1-60 mo**
- **Dose of zinc: ≈20 mg/d (range 5-45 mg/d)**
- **About 25% reduction in episode duration ($p < 0.05$)**

Source: Lukacik et al., Pediatrics 2007

Therapeutic Effects of Zinc Supplementation on Acute Diarrheal Severity



Source: Lukacik, et al., Pediatrics 2007

Therapeutic Effects of Zinc Supplements in Diarrhea, Pneumonia, and Malaria

- 3 trials in pneumonia
- 1 trial in measles
- Multi-center trial in malaria
- 16 trials in acute diarrhea
- 6 trials in persistent diarrhea

Zinc in the Treatment of Pneumonia, Measles or Malaria

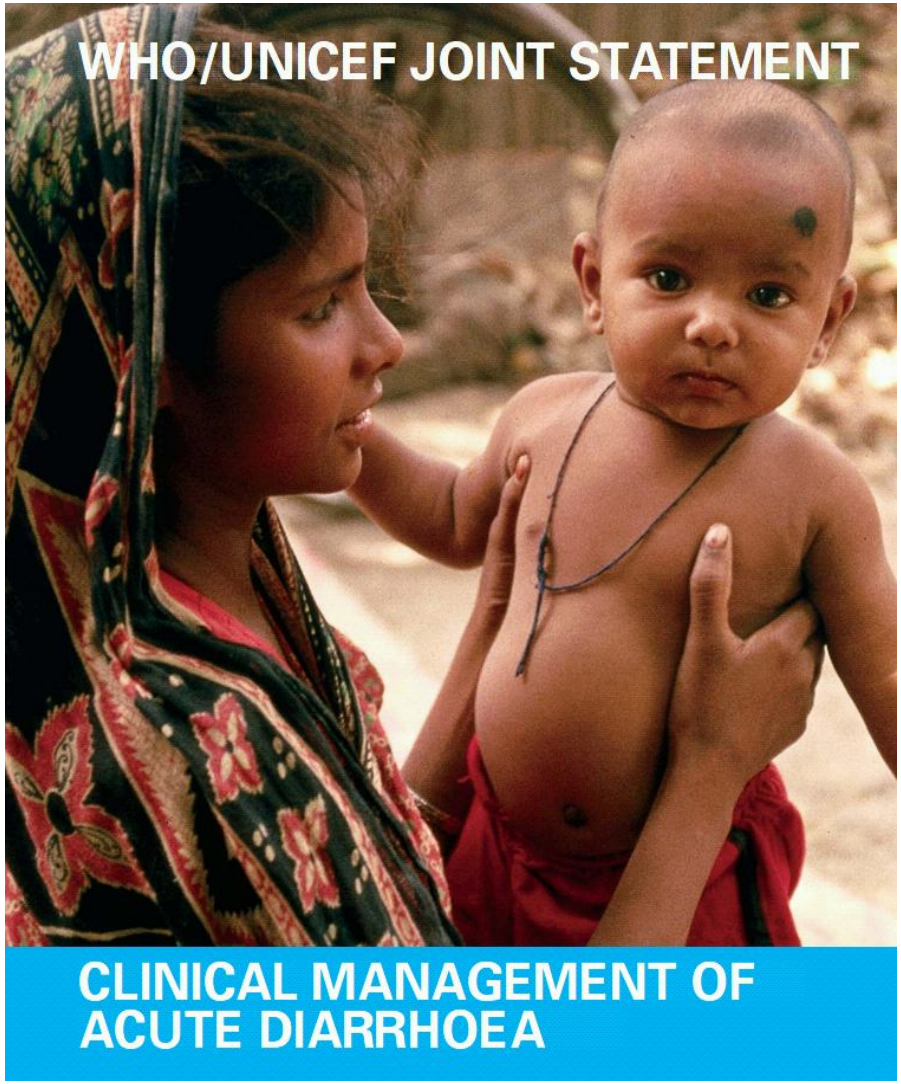
Location	Outcome
India	Faster recovery from pneumonia ($p<0.05$)
Bangladesh	Faster recovery from severe pneumonia ($p<0.05$)
India	No difference in recovery from severe pneumonia
India	No effect on measles
Ecuador, Ghana, Tanzania, Uganda, Zambia	No effect on malaria

Optimal management of diarrhea

- **Joint statement (WHO & UNICEF) in May 2004**

- **Recommend for all cases of acute diarrhea**
  1. **Low osmolarity ORS**
  2. **Oral zinc sulfate 20 mg daily for 14 days**
  3. **Antibiotics in dysentery**
  4. **Continued feeding**

- **No country has as yet implemented this strategy at scale**



Community-based Trial of Zinc Supplementation During Diarrhea in Bangladesh

- **30 health worker areas randomized**
- **8,070 3-59 mo. old children, 11,880 child-years**
- **ORS alone vs. ORS and 20 mg/d zinc**
- **Duration of episodes: RH 0.77 (0.69, 0.86)**
- **Diarrhea hospitalization: RR 0.81 (0.65, 1.00)**
- **Mortality: RR 0.49 (0.25, 0.94)**

Source: Baqui et al., BMJ, 2003

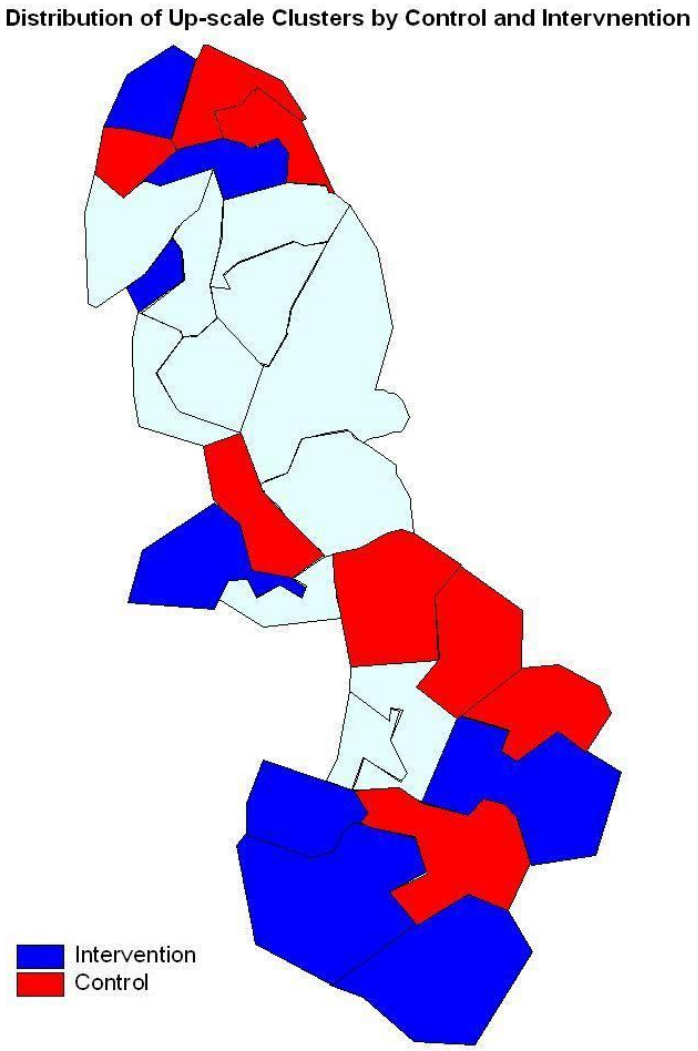
Community-based Trial of Zinc Supplementation during diarrhea in India

- 6 Primary health care center areas allocated to intervention (90,000) and control (90,000)
- ORS alone vs. ORS and 20 mg/d zinc
- Hospitalizations
  - Diarrhea: OR 0.69 (0.50, 0.95)
  - ALRI: OR 0.29 (0.15, 0.54)
  - Total: OR 0.41 (0.29, 0.57)

Source: Bhandari et al., Pediatrics, 2007

Diarrhea Management Effectiveness Trial

- **District Matiari**
  - 859 villages
  - 45,756 households
  - 304,868 population
- **Cluster randomized trial (16 clusters) of diarrhea package**
  - Feeding advice
  - Zinc and low osmolality ORS
  - Delivery through public & private sector staff & outlets




Lady Health Workers & General Practitioners/Pharmacies delivered a package of care for diarrhea

Trainings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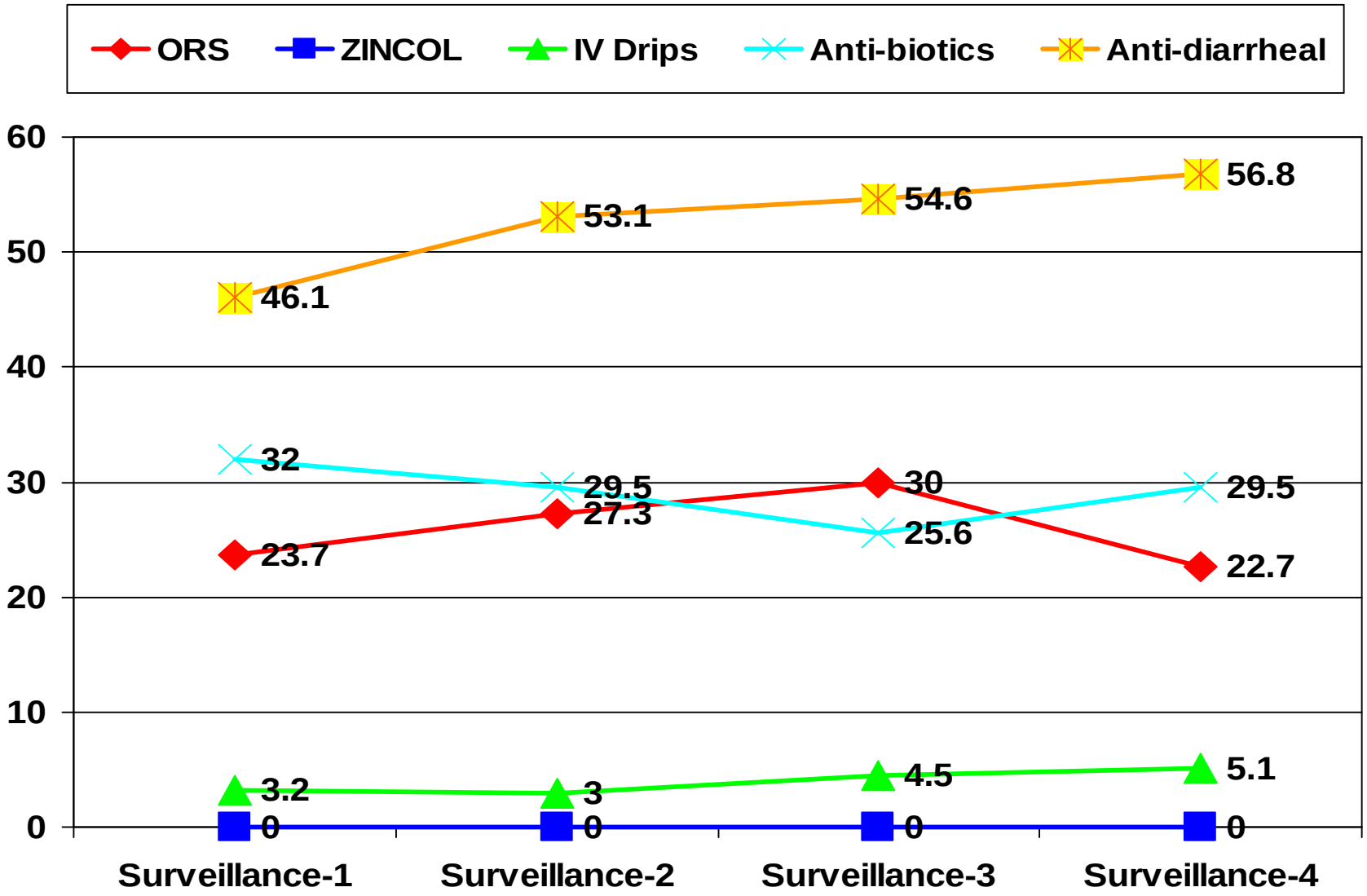
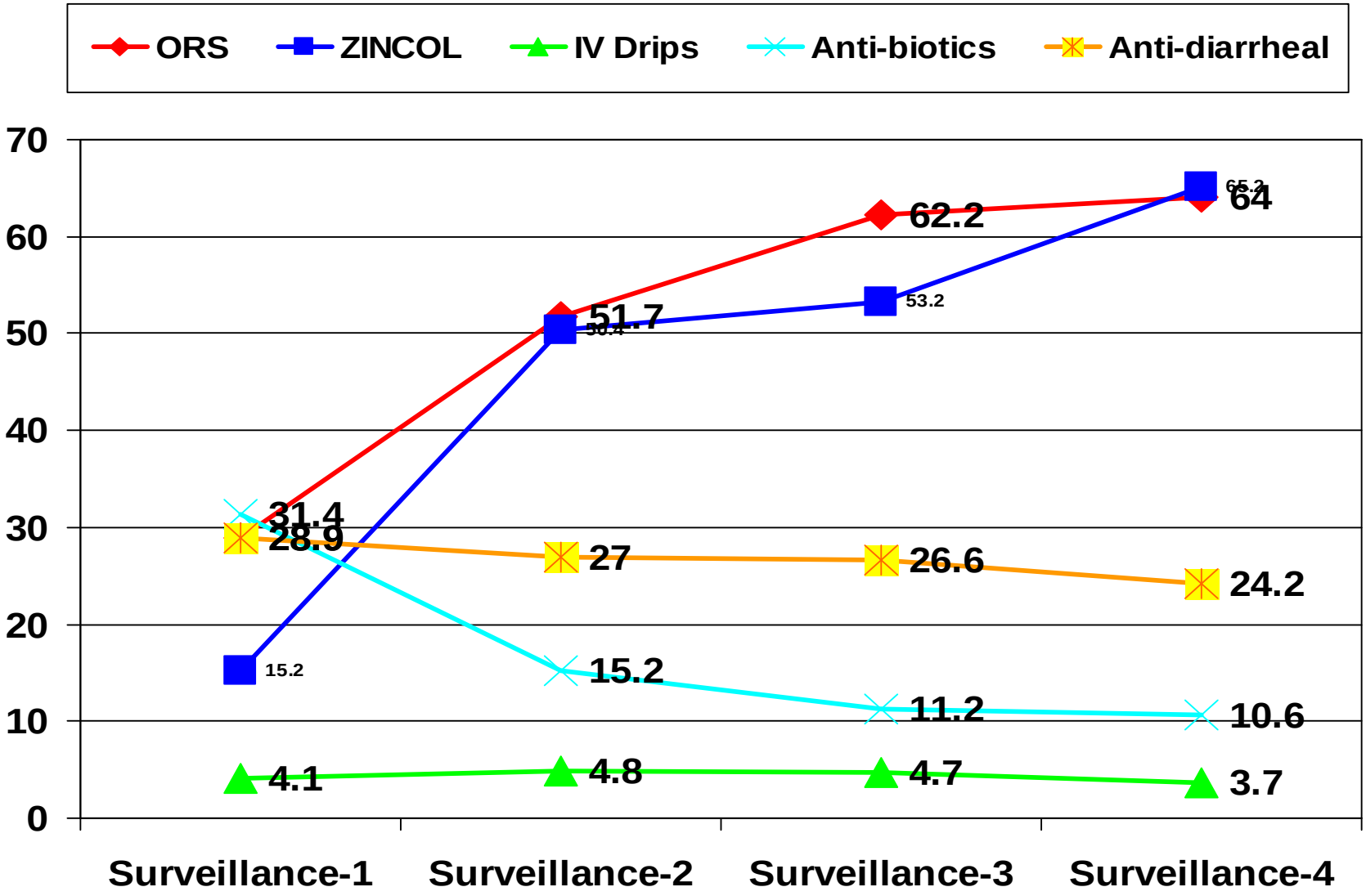
BASIC HEALTH UNIT.
ALLAHDINO SAND.
Zincol


OPRAZOLE
Zincol

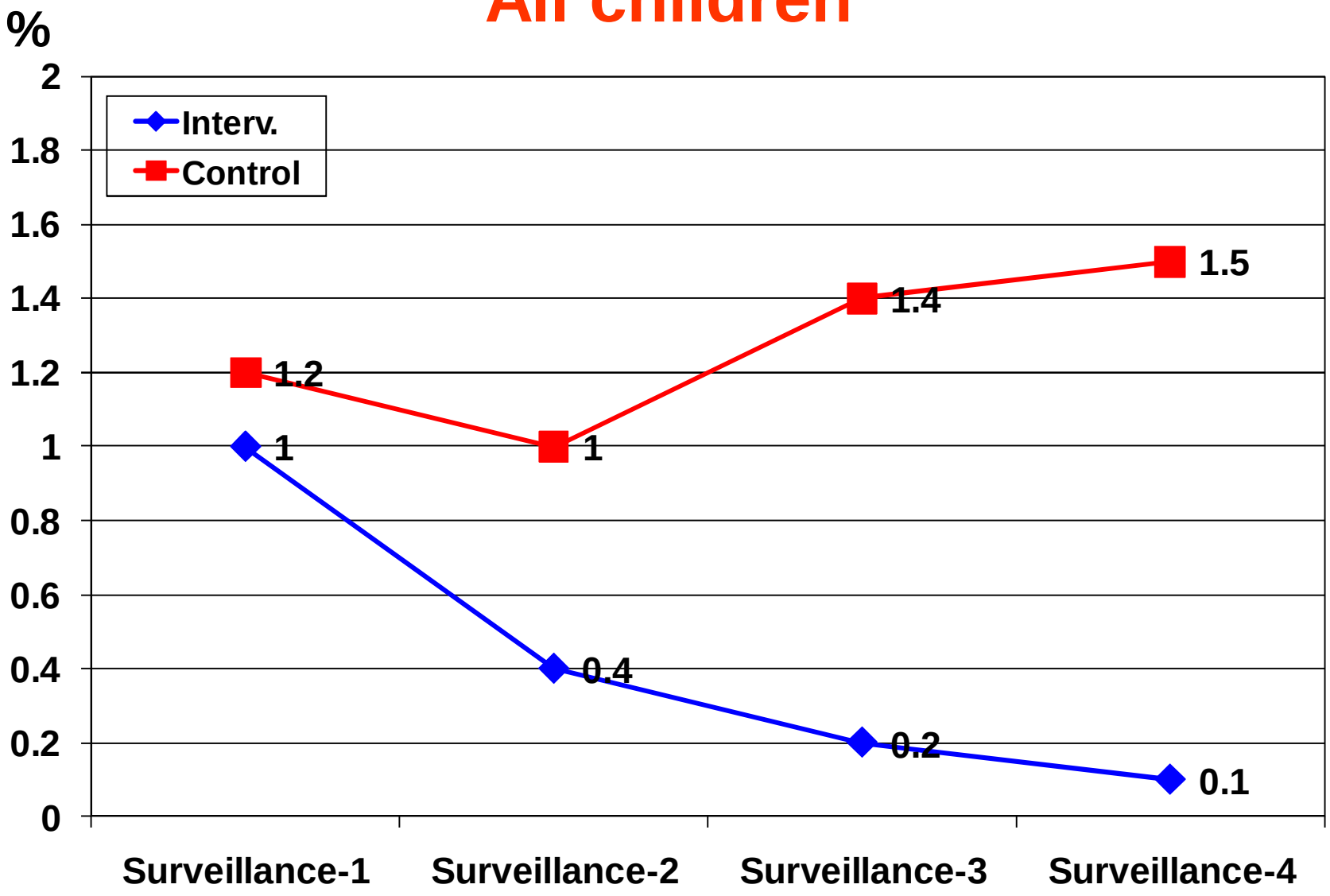
Treatment Received (Control)



Treatment Received (Intervention)



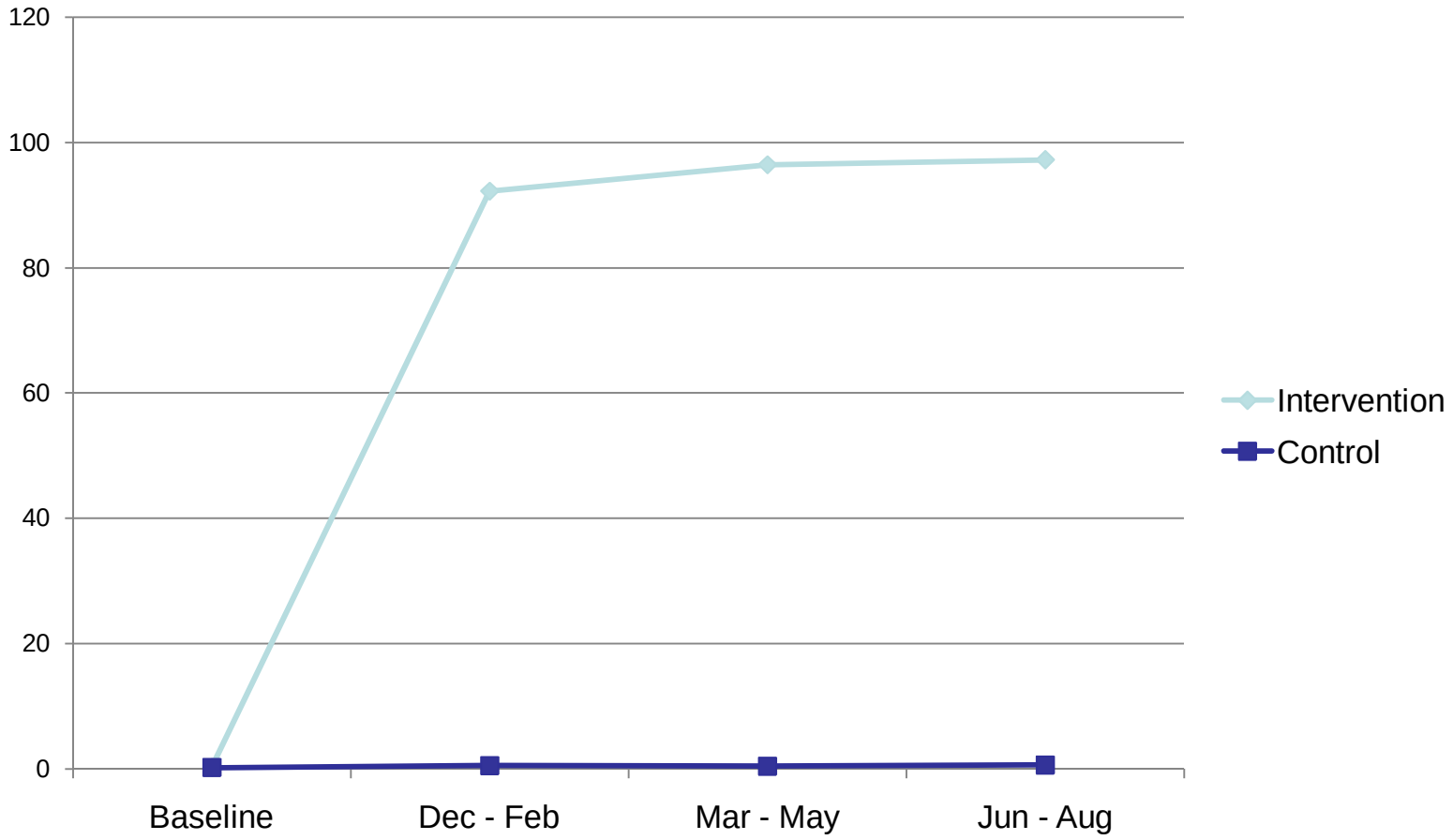
Hospitalization for diarrhea (%)
All children



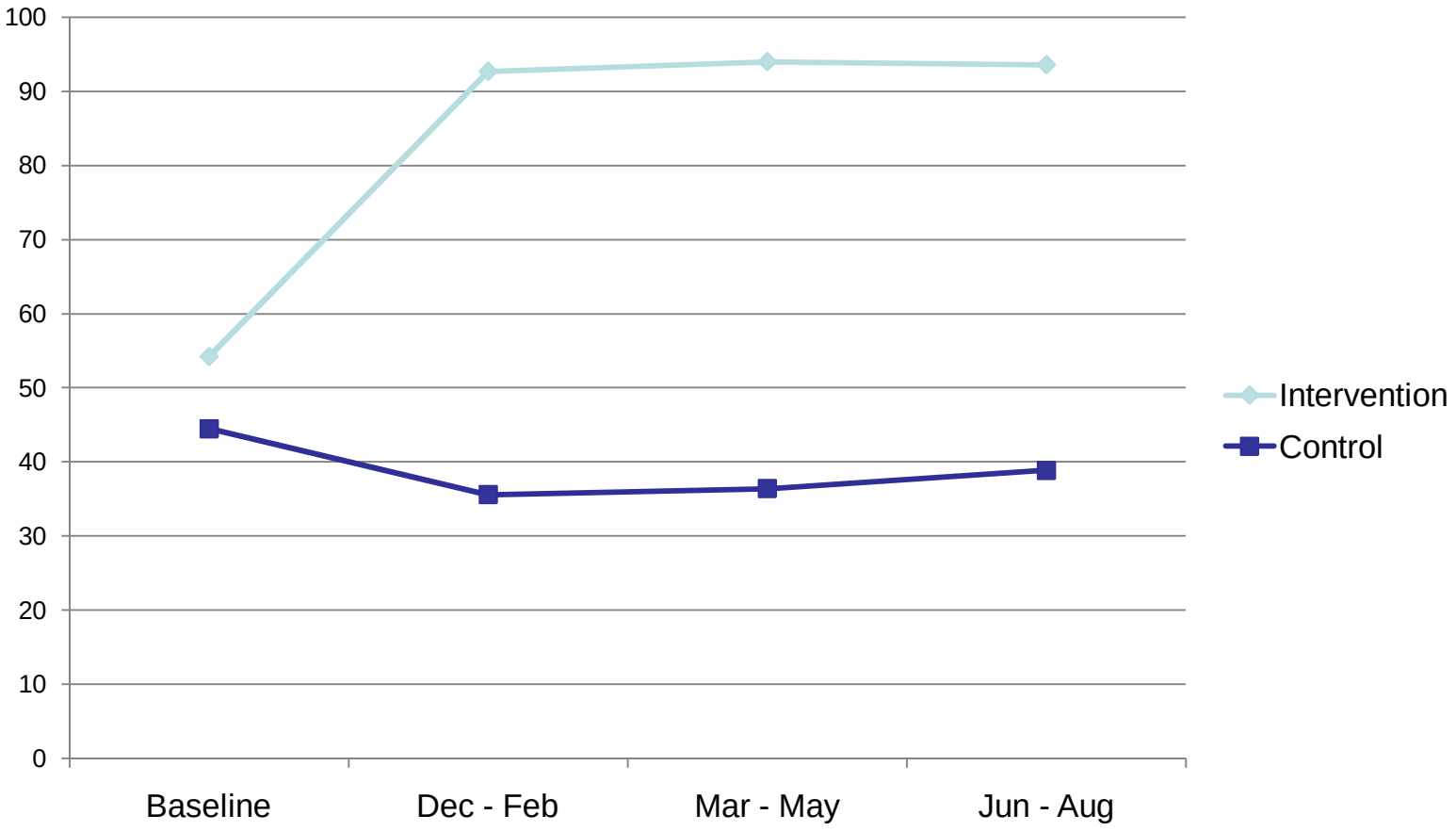
Bhutta et al (2008)

Scaling up Diarrhea Prevention & Treatment

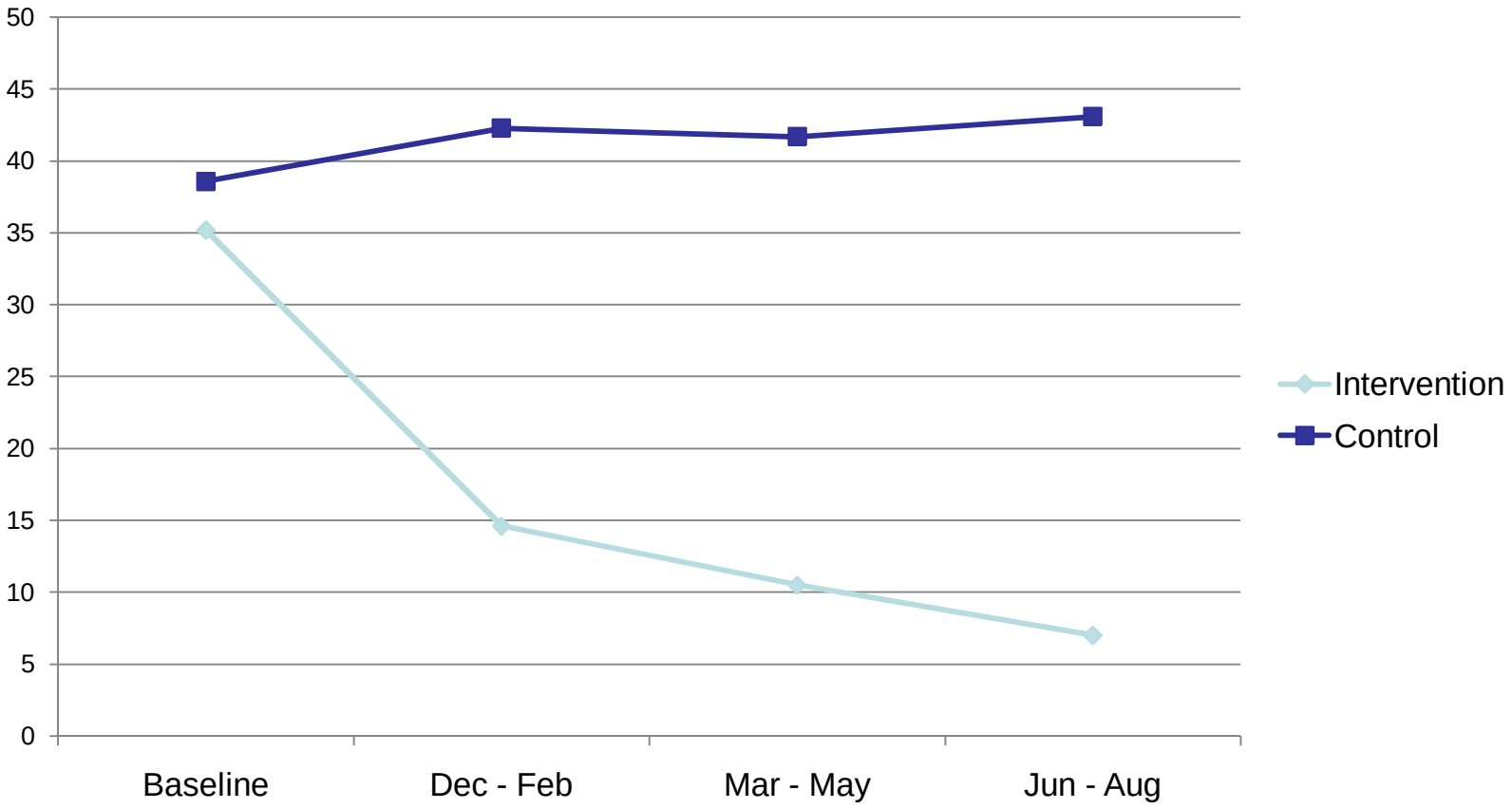
Utilization of Zinc for Diarrhea



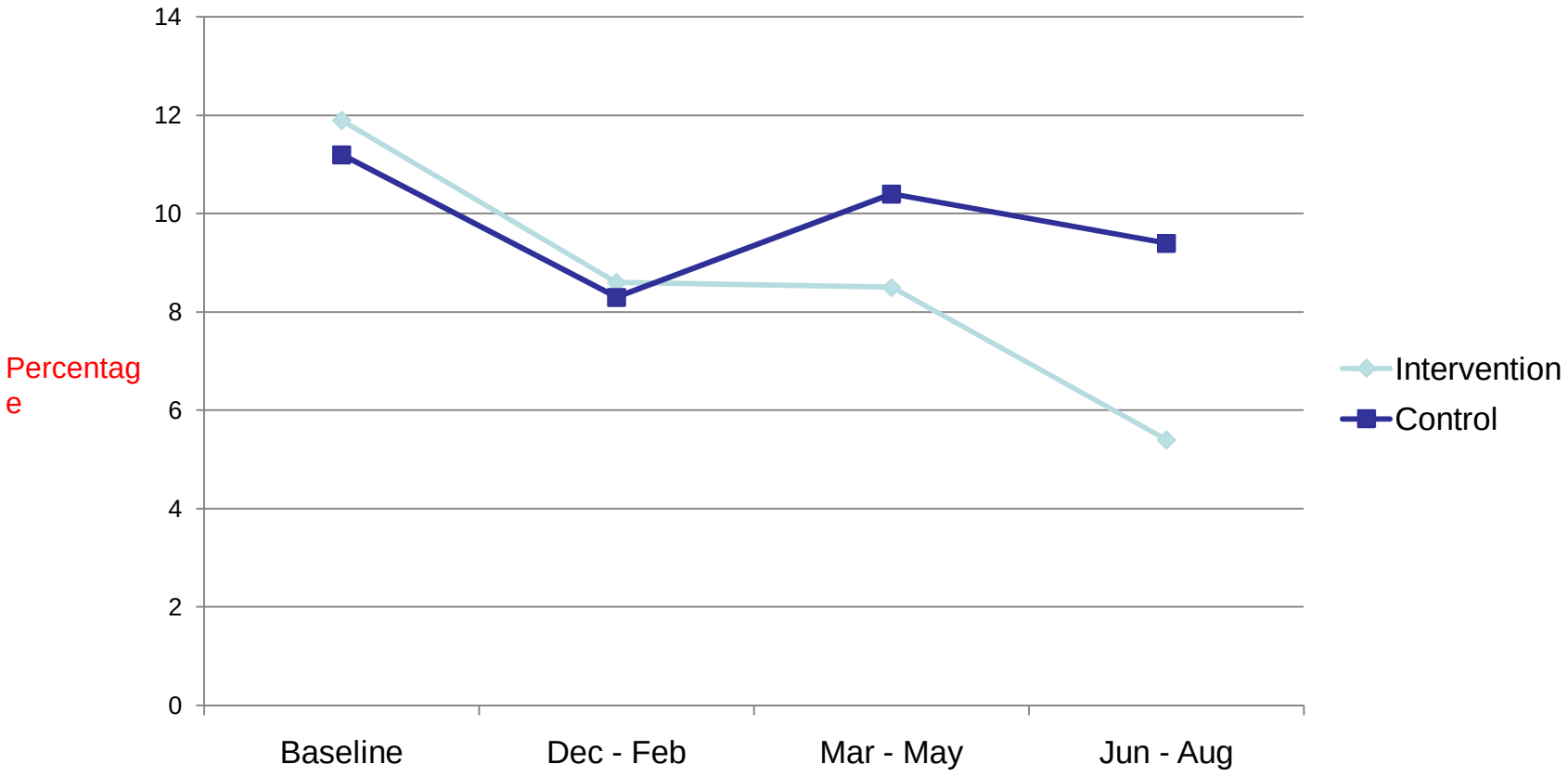
Utilization of ORS in Diarrhea



Utilization of Antibiotics in Diarrhea



Diarrhea Rates (Previous two weeks)



Hospitalization

Indicators	Intervention	Control
Hospitalization	77 (0.9%)	75 (1.1 %)
Mean days of hospitalization	2.6	4.7

Conclusions (1)

- Increasing evidence of the benefits of zinc in human health and disease
- Large parts of the world, especially in developing countries are at risk of significant zinc deficiency and poor dietary intake
- Mechanism of preventive effects probably restoring immune competence
- Mechanisms of diarrhea treatment effect could be anti-secretory, immune or mucosal function

Conclusions (2)

- Zinc in therapy in children – consistent effects on diarrhea, possible effects on pneumonia
- Global scale-up of zinc for treatment of diarrhea is underway

- Zinc in prevention in children – consistent effects on diarrhea, acute lower respiratory infections, and mortality, possible effects on malaria
- Preventative use of zinc for children (supplements/fortification) needs more attention