



Morbidity patterns and factors associated with mortality in the Inpatient Therapeutic Feeding Centre (ITFC) in Abs General Hospital, Yemen

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INTRODUCTION

Context:

- Abs General Hospital serves >1 million people, including internally displaced persons (Figure 1).
- MSF supports the ITFC ward (stabilisation centre).
- ITFC: 60 beds, >100 patients/day during malnutrition peak (June – September).
- Admission: malnourished children (MUAC <125mm, WHZ <-2, +/- bilateral oedema) aged 1-59 months, + medical complication or failed appetite test.

Rationale:

- Mortality rate in the last 2 years: 2 – 7% (threshold: 5%).
- No studies on mortality and adherence to treatment guidelines in eight years of operation.

Objectives:

- Describe the demographic, anthropometric and clinical conditions of patients, and their nutritional and medical treatments.
- To identify risk factors associated with mortality.

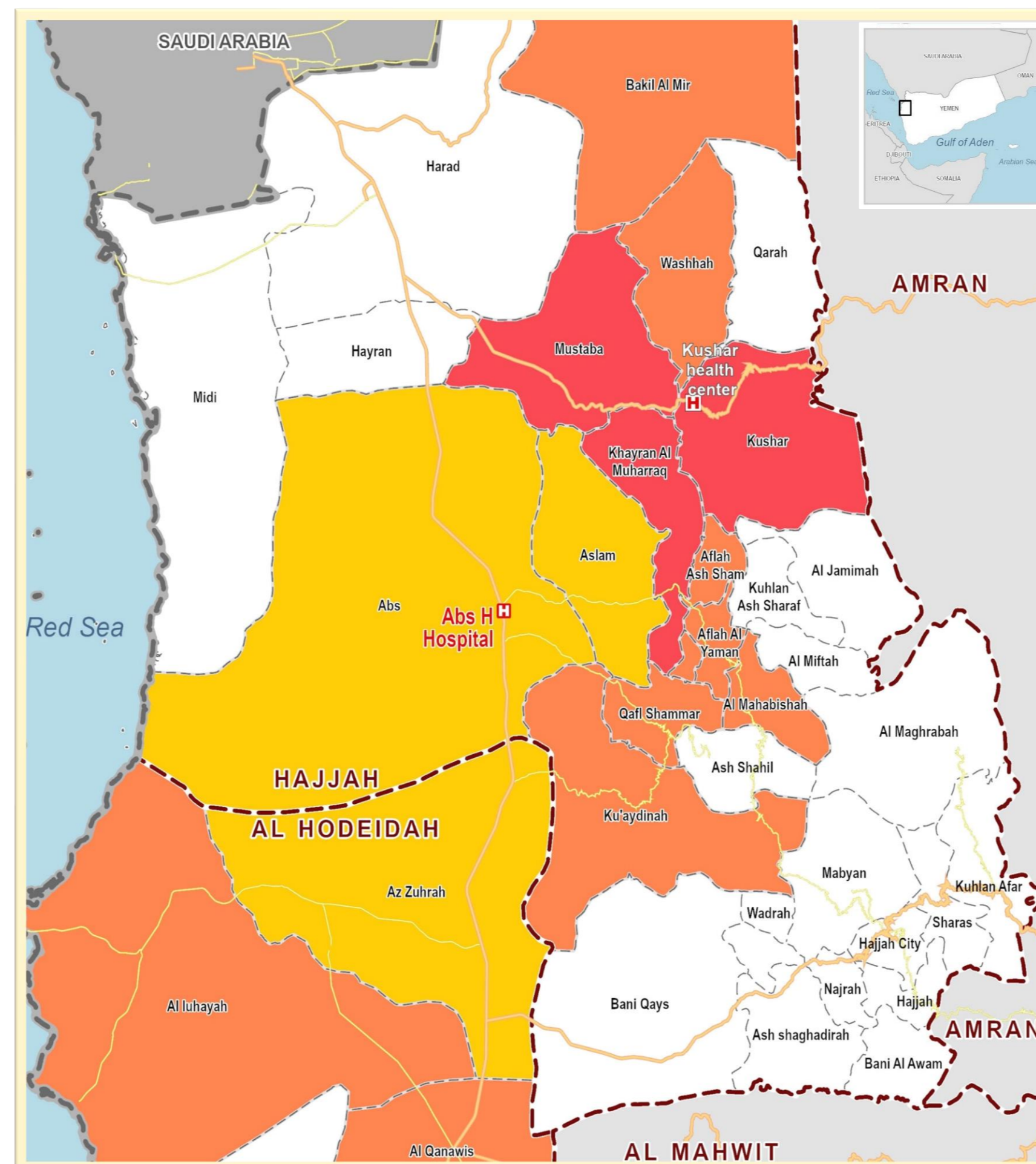
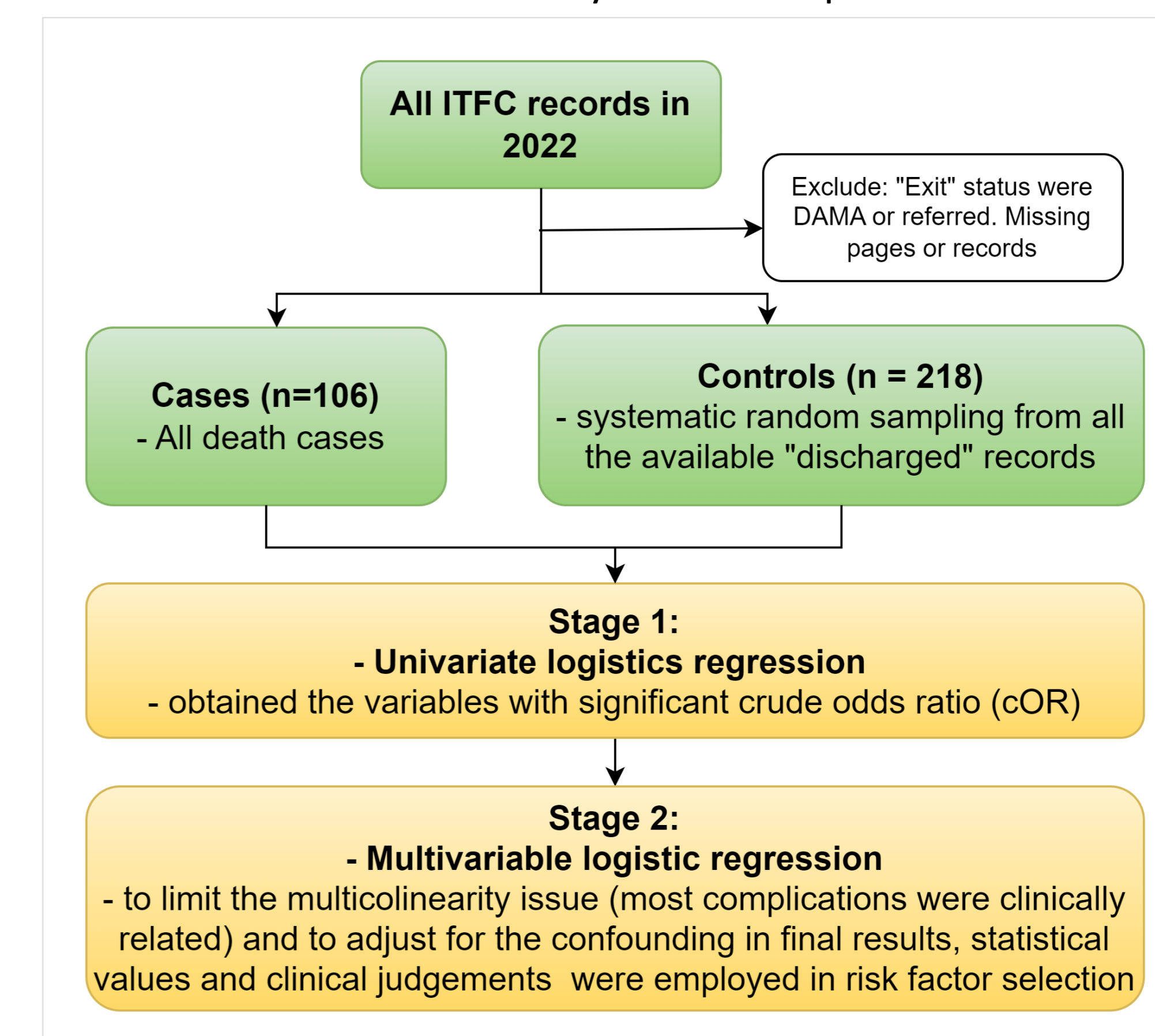


Figure 1. Map of Abs Hospital coverage area.

METHODS

Unmatched case-control study with retrospective data.



RESULTS

1. Demographics of study sample (Table 1).

Characteristics	Overall*	Age < 6 months (n=75)		Age ≥ 6 months (n=249)	
		Discharged alive (n=40)	Death (n=35)	Discharged alive (n=178)	Death (n=71)
Age group					
<6m	75 (23%)	40 (100%)	35 (100%)	-	-
6-23m	217 (67%)	-	-	161 (90%)	56 (79%)
≥ 24m	32 (9.9%)	-	-	17 (9.6%)	15 (21%)
Sex (Female)	162 (50%)	23 (58%)	16 (46%)	86 (49%)	36 (51%)
MUAC category at admission					
≤ 90 mm	67 (25%)	9 (56%)	8 (73%)	25 (15%)	25 (38%)
90-114 mm	173 (66%)	6 (38%)	3 (27%)	127 (74%)	37 (56%)
115-124 mm	24 (9.1%)	1 (6.3%)	0 (0%)	19 (11%)	4 (6.1%)
WHZ score at admission					
< -3	285 (89%)	28 (70%)	30 (86%)	159 (90%)	68 (96%)
[-3, -2)	29 (9.0%)	7 (18%)	4 (11%)	15 (8.5%)	3 (4.2%)
Oedema					
+	15 (4.6%)	2 (5.0%)	1 (2.9%)	3 (1.7%)	9 (13%)
++	19 (5.9%)	0 (0%)	5 (14%)	3 (1.7%)	11 (15%)
+++	14 (4.3%)	1 (2.5%)	3 (8.6%)	1 (0.6%)	9 (13%)

Table 1. Demographic and anthropometrics of study samples. *Major diagnoses at death: pneumonia (38%), gastroenteritis (24%), sepsis (23%). Major immediate cause of death: Respiratory failure (31%), multi-organ failure (17%), septic shock (14%).

3. District of origin is significantly associated with ITFC mortality.

- Those who came from further have higher chances of death (Table 2).
- Patients coming from further districts arrived in more severe condition. They have more complications, with most complications associated with mortality, compared to those living near Abs.

Districts	N	Odds Ratio	95%CI	Map In Figure 1
Az Zuhrah, Aslem	105, 21	Not sig.		Yellow
Kushar	12	6.1	1.8, 24.0	Red
Mustaba	11	3.6	1.0, 13.5	Red
Khayran AL Muharraq	15	3.5	1.1, 10.7	Red
Others	37	2.3	1.1, 5.0	Orange

Table 2. Districts and its odds ratio for ITFC mortality.

2. Factors significantly associated with ITFC mortality.

- Figure 2 highlights the ITFC mortality risk factors.
- Thirty-two (32) variables from the domains of demography, congenital conditions, presentation at emergency department, and medical complication that were significant in the univariate analysis were dropped from the multivariable analysis.
- Medical complications found exclusively among the deceased – electrolyte disturbance (n=39), hypothermia (n=18), acute kidney injury (n=17) and coma (n=13).
- Sub-analysis of ≥ 6 months: Oedema was additional risk factor while hepatomegaly and congenital heart disease were not.
- Sub-analysis of those without congenital diseases: additional risk factors were diarrhoea that persists and seizure.

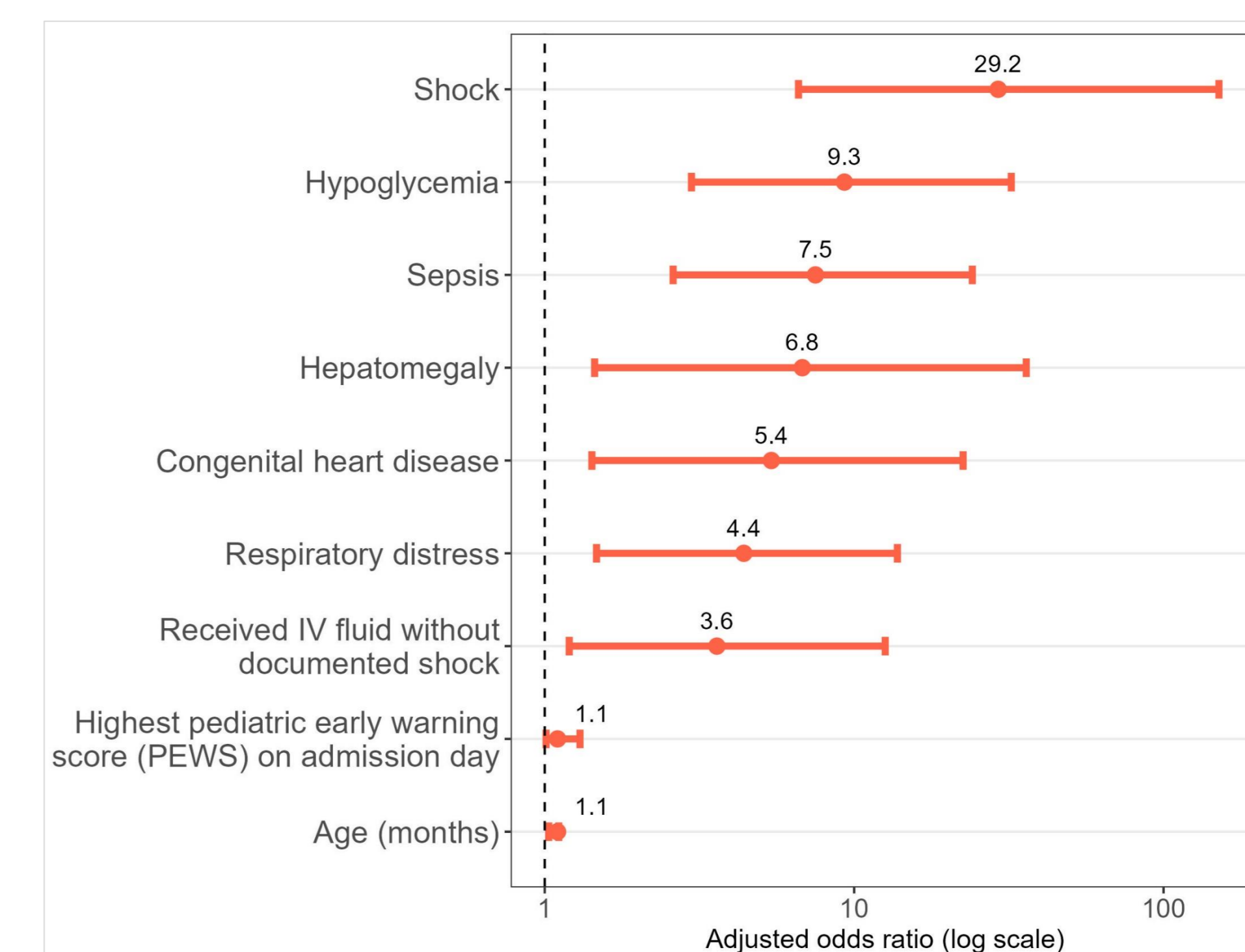


Figure 2. Factors significantly associated with ITFC mortality.

4. Adherence to hydration and nutrition protocol may affect ITFC mortality and morbidity.

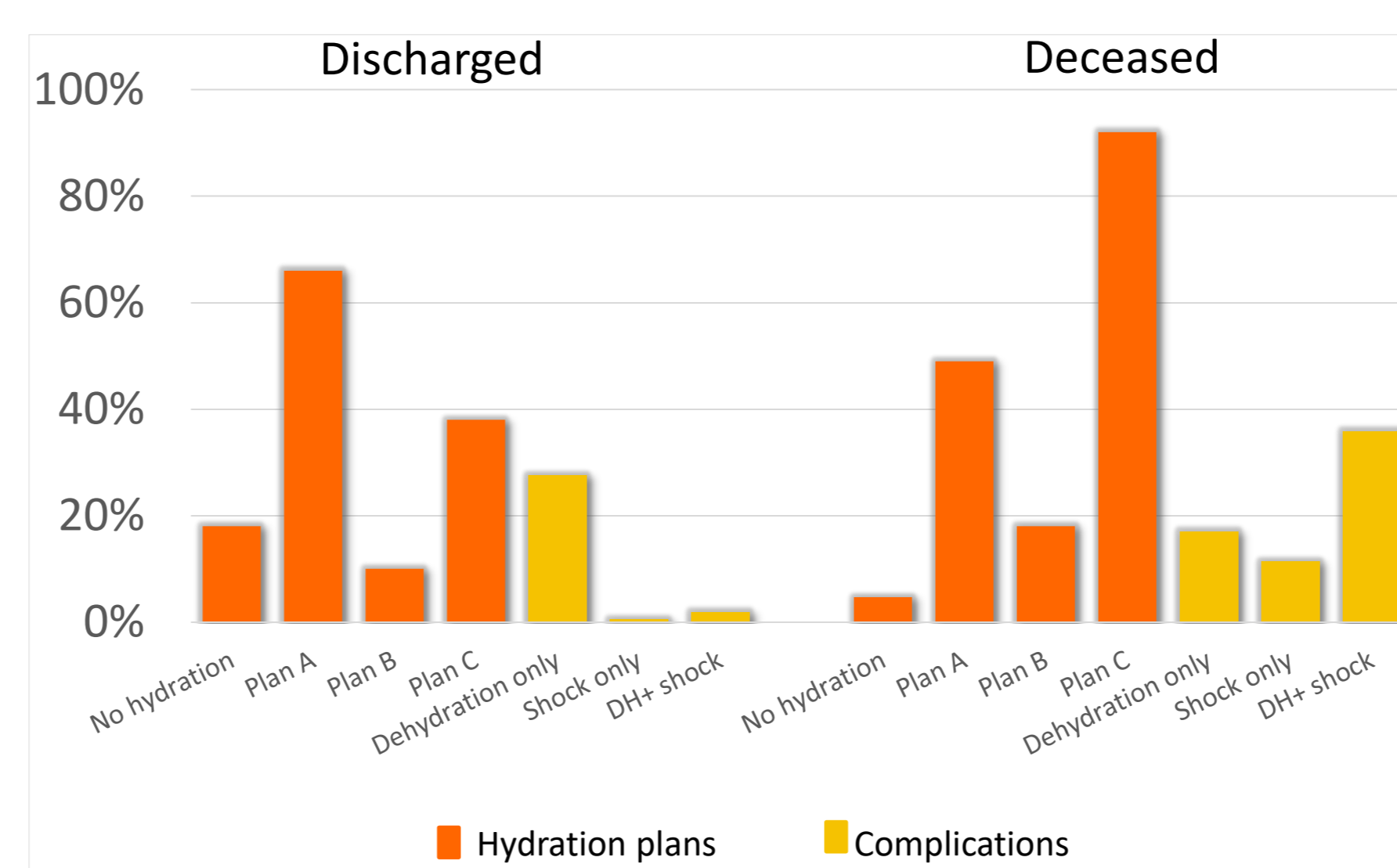


Figure 3. The proportion of hydration plans and complications. Note: Plan A = ReSoMal PRN; Plan B = ReSoMal 2-hourly & PRN; Plan C = IV fluid.

- Prior knowledge: Rehydration in children with severe acute malnutrition (SAM) must be performed slowly. Nutritional rehabilitation is as important as medical treatment.
- Plan B was the least used plan (Figure 3). There were more patients on Plan C than those with relevant complications.
- 45% of the patients were on nasogastric tube (NGT) feeding; reliance on NGT hinders oral intake.
- 32% of the patients were nil-per-os (NPO); these patients were often more severe.
- Plan C, NGT and NPO were significantly associated with mortality and PEWS score deterioration, but this relationship **cannot** be ascertained without accounting for confounding factors.

Translating findings to improve ITFC patient care

- Two doctors were assigned as ITFC focal points, tasked to reinforce protocol adherence and monitor clinical and nutritional management.
- The focal points presented findings to the all doctors, emphasising the mortality risk factors, and gave refresher on patient management protocol.
- Designated a “red zone” to monitor unstable children identified based on the risk factors, and increase the follow-ups.
- Monitor closely the usage and duration of IV fluids, NGT and NPO, avoid when not indicated.
- Promote and support breastfeeding/oral feeding practices.
- Obtain blood culture for critical cases; if indicated, escalate antibiotic treatment.
- Admit patients with conditions such as congenital heart disease, cerebral palsy, Down syndrome to general paediatric ward.

LIMITATIONS

- Some important variables were not obtainable or verifiable due to the retrospective study design, such as the severity of the dehydration, the appropriateness and duration of NGT and NBM. This made it difficult to establish clear relationships for non-adherence and mortality.
- The wide 95% CI in Figure 3: The small prevalence (<5%) of independent variables (the risk factors) in the control group may have resulted in higher odds ratio but wider uncertainty.
- We did not distinguish whether the complications were already present at admission or developed in the ward. Though such stratification would provide a better description of the patients, it would still be reconvened as one variable in the risk factor analysis.

CONCLUSION

Certain medical complications, congenital disease and further districts appear to pose as significant mortality risk factors to patients admitted to the ITFC. The study's findings have been used to initiate quality improvement measures on the clinical management of ITFC and the adherence to the nutrition protocol.

ETHICS STATEMENT: Fulfils the exemption criteria set by the MSF ERB and was approved for submission by the OCBA Medical Director and Abs Hospital Director. All data are anonymised.