

## Treatment Outcomes of Severe Acute Malnutrition Cases Admitted to Asella Teaching Referral Hospital

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### Abstract

**Background:** Malnutrition is a major public health problem throughout the developing world and is an underlying factor for Childhood morbidity and mortality each year. The management of SAM is critical for child survival and is a key component under the SUN Movement. This study aims to investigate the treatment outcome and factors in Asella referral teaching Hospital.

**Methodology:** Retrospective review of severe acute malnutrition Cases admitted to Asella Referral and teaching Hospital TFP Registration book of in one year from 01/July/2015 - June 2016 EC, using data extraction format. Data entered to SPSS 21 and Chi square test done for bivariate analysis the association was expressed in OR and binary logistic regression for Multivariate analysis and strength of association. Hosmer-Lemeshow goodness-of-fit were used in the analyses. Results from bivariate analysis of  $p < 0.2$  were transferred to multivariate analysis. For binary logistic regression, outcome was dichotomized and coded as (died = 0, cured = 1). A statistical test was significant at  $P\text{-Value} < 0.05$ .

**Result:** Total of 179 severe acute malnutrition cases were admitted to Asella referral and teaching hospital, from July 2015 to June 2016. The mean age in months  $7.8 \pm 1.14$  SD. Treatment outcome 51.3% Cured, 11.5% Death rate, 30.9% Defaulter rate, and 6% medical transfer rate. 89.4% were new cases, 66.4%,  $< 24$  month, 58.6% were wasted, and ALOS 8.9 days. Admitted SAM cases  $> 6$  month AOR 3.15 (2.71, 6.23)  $p < 0.05$ , more likely cured compared to younger age.

**Conclusion and Recommendations:** Severe acute malnutrition treatment out come in Asella referral and teaching Hospital is below the sphere standard and Community based Management of Acute malnutrition cases should be strengthened.

**Keywords:** Severe Acute Malnutrition; Asella Referral Teaching Hospital; Treatment Outcome

### Abbreviation

LOS: Length of Stay; MUAC: Mid: Upper Circumference; OTP: Outpatient Program; PHCU: Primary Health Care Unit; SAM: Severe Acute Malnutrition; SUN: Scaling Up Nutrition; SC: Stabilizing Center; TFP: Therapeutic Feeding Program

### Introduction

Malnutrition is a major public health problem throughout the developing world and is an underlying factor in over 50% of fewer than five who die in millions each year of preventable cause. Childhood under Nutrition is a Major global health problem which contributing a Child Morbidity, mortality, Impaired intellectual development, suboptimal adult work capacity and increased risk of diseases in adult hood.

Acute malnutrition is an extremely common disorder associated with high rates of mortality and morbidity and required special treatment and prevention intervention. Severe Acute Malnutrition affects nearly 20 million pre-school age children mostly from Africa and South-East Asian region. Children with SAM are 9 times more likely to die than well-nourished children. Malnutrition is significant

factor in approximately 1/3 of nearly 8 million deaths annually who are under 5 year of age worldwide and 60% of death in children in developing country. From this approximately 35% are due to nutrition related factors and 4.4% specifically attributed to severe wasting.

Children who are identified as having severe acute malnutrition should first be assessed with a full clinical examination to confirm whether they have medical complication and whether they have poor/no appetite. Children who have medical complication, severe edema (+++) or poor/Failed appetite should be treated ad inpatient. The management of SAM is critical for child survival and is a key component of minimum Nutrition package to address under nutrition under the SUN Movement.

Children Discharged from Therapeutic Feeding program when weight for height/length is  $\geq -2$  Z score, and have no edema for at least 2 weeks, or mid upper arm circumference is  $\geq 125$  mm and they have had no edema for at least 2 weeks [1,2].

### Objectives

To investigate the treatment outcome and factors.

### Operational Definition

1. **Severe acute Malnutrition (SAM):** Children 6 - 59 months of age as weight for height/length  $< 70\%$  of median standard, or Z-Score of  $< -3$  Standard Deviation of WHO Standard or Mid upper circumference (MUAC)  $< 110$  MM or Bilateral pitting Edema (+,+,++) and Visible severe wasting of Pitting Edema for  $< 6$  months of age. For this study Sever acute Malnutrition Cases Defined NCHS Standard, W/H%  $< 70\%$ , MUAC  $< 11$  CM, Nutritional Oedema.
2. **Inpatient Management:** Management of SAM of children of 6 - 59 months with medical complications or poor/fail appetite and SAM  $< 6$  month.
3. **Cure/Recovered:** SAM cases admitted to Therapeutic feeding program and reached discharge criteria, MUAC  $\geq 110$  mm, or absence of Edema for two weeks.
4. **Defaulter:** A SAM patient who become absent continuously from the therapeutic feeding program inpatient care for 48 hour.
5. **Non-responder:** SAM patient admitted to inpatient who do not reached discharge criteria after 40 days in the inpatient program.
6. **Died:** Severe Acute Malnutrition Patient admitted that discharged as died.

### Background

Asella is a town lies west of Mount Chilalo on a high plateau overlooking Lake Ziway in the Great Rift Valley 2,430m (7,970 ft). The town Located in the Arsi Zone of the Oromia Region, south-central Ethiopia about 175 kilometers from Addis Ababa, this city has a latitude and longitude of  $7^{\circ}57'N39^{\circ}7'E$   $7.950^{\circ}N$   $39.117^{\circ}E$ , with an elevation of 2,430 meters. Asella has been the home of many Ethiopian track athletes, including Haile Gebrselassie, Derartu Tulu, Kenenisa Bekele and Tirunesh Dibaba. In 1946 a Swedish Mission laid the foundations for a hospital and a school in Asella, which was ordered closed in 1966 when a government hospital was built. The Arsi University was established in Asella in 2015. Asella Referral and Teaching University Hospital becomes a University teaching hospital. The hospital is one Health Facilities providing Therapeutic Feeding Program, Inpatient care for Severe Acute Malnutrition cases referred from the districts and villages from the zone. The Hospital Provides the Severe acute malnutrition case management in Pediatrics wards. In Hospital there are trained Health workers on Federal Ministry of health SAM management. It admits severe acute malnourished cases with Medical Complication and failed appetite to an inpatient and link severe acute malnourished cases without medical complication for outpatient to the nearest health Facilities. Admitted Sever cases those recovered and stabilized transferred out to Outpatient program in Health Centers and health Posts.

**Methodology**

**Study Area:** Asella Referral and Teaching Hospital.

**Study Design:** Retrospective review of admitted cases with Severe acute Malnutrition from Standardized therapeutic Feeding Program (TFP) Registration book and Multi chart/Patient chart of 179 patients who were admitted to the Hospital of in one year from 01/ July/2015 - June/30/ 2016, using data extraction format from Asella Referral and teaching Hospital, Ethiopia.

**Study Population:** In this study All Severe acute malnutrition (SAM) patients 0 - 59 months who enrolled in inpatient care for 1 year between July 2015 to June 2016 were included. SAM cases with some variables missed not included in this study. A total of 179 (N-179) cases with Severe Acute malnutrition admitted to hospital Inpatient were reviewed but 171 (N-171) were included in analysis.

**Inclusion Criteria:** Severe acute malnutrition cases 0 - 59 months admitted and the admission criteria and outcome recorded on registration book.

**Exclusion Criteria:** SAM patient of Age  $\geq$  5 year and 0 - 59 months cases but those admission criteria and outcome not recorded.

**Study Period:** A one Year Document review from July 2015 - to June 2016.

**Outcome of Interest:** Severe acute malnutrition treatment out comes were Recovery rate/Cure rate, Death rate, Defaulter rate, Non-Responder rate, Medical Transfer rate, Transfer out rate, Average length of stay, Average weight gain.

**Dependent Variables:** Outcome variables- Cured, Died, Defaulted, Non-Responder, Medical transfer, Unknown and transfer out).

**Independent Variables:** Predictors were Age, Sex, Residence, and Admission Criteria W/H%, MUAC, Edema).

**Data Collection:** 179 Cases were extracted from Standard Therapeutic Feeding Program registration and Multi chart/individual patient record.

**Data Processing and Analysis:** Data was checked, cleaned and interred to Epi Info 3.5.4 and transferred to SPSS 21 for analysis.

**Data Quality Assurance**

To ensure the completeness and consistency of information during data collection, the principal investigator checked before receiving the filled format from each data collector. For binary logistic regression, treatment outcome was dichotomized into cured and died; and coded as (died = 0, cured = 1). Chi square test done for bivariate analysis the association was expressed in odds ratio (OR) and binary logistic regression for Multivariate analysis and strength of association between outcome of interest and determinant. Hosmer-Lemeshow goodness-of-fit were used in the analyses. Results from bivariate analysis of  $p < 0.2$  were transferred to multivariate analysis. A statistical test was significant at P-Value  $< 0.05$ .

**Ethical Consideration**

There was no direct contact between data collector and the patient and secondary data was used and anonymous and Confidentiality of the information was secured.

Indicator	Acceptable	Alarming
Recovery rate	> 75%	< 50%
Death Rate	< 10%	> 15%
Defaulter Rate	< 15%	> 25%
Average Length of stay	$\leq$ 4 week	> 6 Week

**Table 1:** Reference value for the main indicators ©Sphere project [2].

### Indicators calculation

1. Recovery rate/Cure rate:  $\frac{\text{No of SAM patients discharged for recovery July 2015- June 2016}}{\text{Total Number of Discharge}}$
2. Death rate:  $\frac{\text{No of SAM patients discharged for Died July 2015- June 2016}}{\text{Total Number of Discharge}}$
3. Defaulter rate:  $\frac{\text{No of SAM patients discharged for Default July 2015- June 2016}}{\text{Total Number of Discharge}}$
4. Non-Responder rate:  $\frac{\text{No of SAM patients discharged for Non Respond July 2015- June 2016}}{\text{Total Number of Discharge}}$
5. Average Length of Stay:  $\frac{\text{Sum of number of days for each discharge recovered patient}}{\text{Number of recovered patients}}$

Average length of stay was calculated by adding the total number of days that each admitted under five discharge as recovered stayed in the inpatient divided by the number the number of children cured [3].

### Result and Discussion

In the past one year period from July 2015 to June 2016, a total of 179 SAM cases were admitted to Asella referral and teaching Hospital therapeutic feeding unit. From the total admitted cases, 60.3% were male in sex and 83.2% are referred from rural area, and majority, 89.4% were new admission. 21.8% were less than 6 month, 66.4% were < 24 month and the mean age  $17.8 \pm 1.14$  SD. Admission criteria indicated that majority (58.6%) of admitted cases were wasted and 19.6% was Edematous. Similar study in Zewuditu Memorial Hospital, Ethiopia, showed 75.6% [4] of cases admitted were marasmic and also study in Southern Ethiopia showed 47% wasted, 53% Edematous [5]. children with SAM are 9 times more likely to die than well-nourished children. The management of SAM is critical for child survival and a key cost effective component of scaling up [6]. This study showed treatment outcome showed that cure rate was 51.3%, defaulter rate was 30.9%. Transferred out to OTP accounts 28.7%. Death rate was 11.5% and 6.2% medically transferred. From admitted SAM cases 12.41% were stayed for < 4 week and LOS was 5.7 Days. Similar study in Zewditu Memorial Hospital, showed death rate was 21.3% [3] which is larger. Another study result from Southern region of Ethiopia showed that Cure rate 87%, Death rate 3.6%, and 9.1% Defaulted and Length of stay 25 days [4]. The study in Gondar University tertiary Hospital showed 68.5% Cure rate, 19.8% were defaulted and 11.7% Died [5]. In kamba District of south west Ethiopia, recovery rate was 67.7%, and ALOS 7.14 [6]. Treatment out come in St. Mary's Hospital Lacor, Northern Uganda showed Cure rate 66.9%, Death 11.9%, Defaulter 8% [7]. In Tamale teaching Hospital, Ghana, from total Children admitted, 63.2% were < 24 Month almost similar with current study result.

Days spent in therapeutic care  $7.0 \pm 5.4$ , minimum 1 day and max 74 days, 33.6% Recovered, 49.1% defaulted and 67% referred [8]. Meta-analysis Study in low and middle income setting CFR 14%, Recovery rate 71% [9]. Another study in deghabour Hospital, Eastern Ethiopia, 94.7% were new admission, and 3.3% were readmission, and 73.9% from Urban, from total admission cases 81.7% were Wasted cases, 4.8% Edematous and 87% cured and 13% died [10]. Another study in North Ethiopia Wolida Hospital, showed Cure Rate 85% death rate 6%, Defaulter Rate 5%, transferred out rate 4%, Length of stay  $13 \pm 7.2$  [11].

Study in Malawi found that a mortality rate was 5.4% in inpatient and in Bangladesh mortality rate was 3.5% in inpatient [12]. In Eastern Province of Zambia, SAM treatment outcome showed that recovery rate was 80%, death rate was 2.8% and Defaulter rate 17.2% [13].

The Minimum international acceptable standard set for the outcome of inpatient management of severe acute malnutrition is a cure rate of at least 75%, Mortality rate < 10%, Defaulter rate < 15%, mean Weight gain  $\geq 8$  gram/kg/day, and average length of stay < 4 week.

**Factors associated with Treatment outcome of SAM**

Admitted Severe acute malnutrition cases greater than 6 month Age AOR 3.15 (2.71, 6.23)  $p < 0.05$ , more likely cured compared to younger age, Similar study in St. Mary’s Hospital Lacor, Northern Uganda Newly admitted cases 1.23 (2.71, 4.62) at  $P < 0.05$  more cured than repeated cases. Showed Younger infants 3 - 12 months were more likely die compared to child above 1 year and The high number of death rate is associated to inappropriate case management Time of Recovery 17.3 days  $P < .001$  [7].

Variable		Frequency (N)	Percentage (%)
Residence	Rural	160	89.4
	Urban	19	9.6
	Total	179	100
Sex	Male	108	60.3
	Female	71	39.7
	Total	179	100
Age (Months)	< 6 month	39	21.8
	6 - 11 month	40	22.3
	12 - 23 month	44	24.6
	24 - 59 month	56	31.3
	Total	179	100
Admission Criteria	W/H%/MUAC (Wasted)	110	64
	Pitting Edema	31	18
	VSW or Edema for < 6 month	30	17.5
	Total	171	100
Length of Stay (LOS) for Cure cases in weeks	< 4 weeks	55	94.8
	4 - 6 weeks	3	5.2
	> 6 weeks	0	0
	Total	58	100
Treatment outcome	Cured	58	51.3
	Died	13	11.5
	Defaulted	35	30.9
	Medical Transfer	7	6.2
	Transfer to OTP	49	28.7
	Transfer to other SC	9	4.7
	Unknown	8	4.5
	Total	179	100

**Table 2:** Socio Demographic, Admission criteria and treatment outcome, Asella Referral teaching Hospital, Asella, Ethiopia, June 2016 [ N-179].

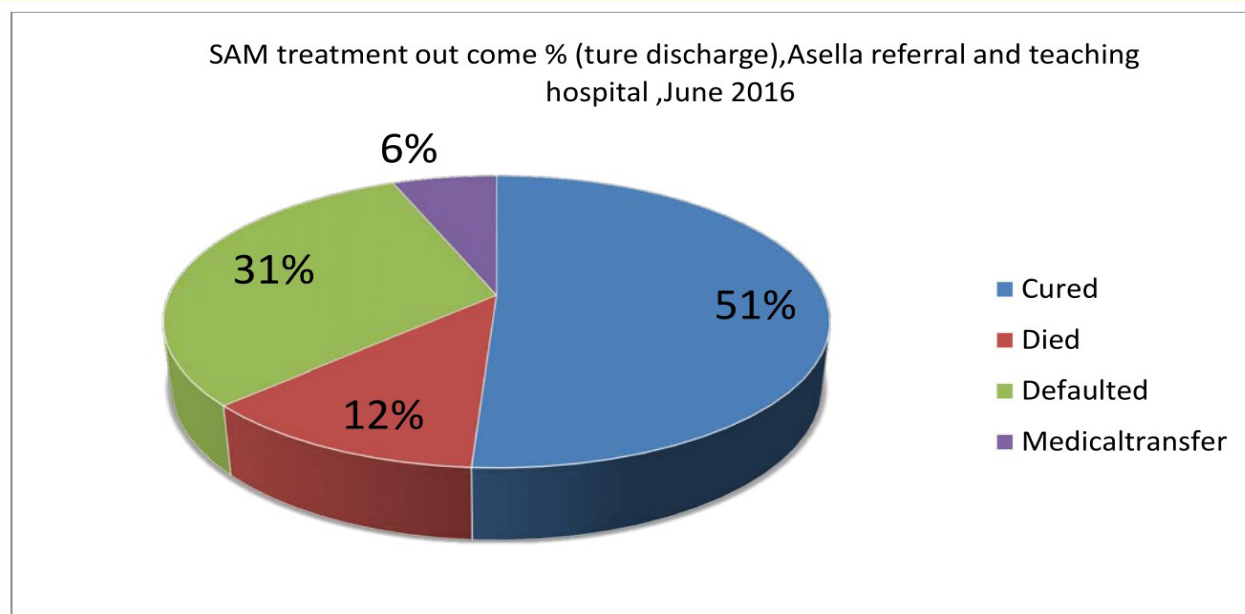


Figure 1: Asella Referral teaching Hospital, SAM treatment outcome, June 2016.

Indicators Calculation		Reference value for @Sphere Project		Remark
Indicators	Result (%)	Acceptable (%)	Alarming (%)	
Recovery Rate	51%	> 75%	< 50%	Alarming
Death rate	11.5%	< 10%	> 15%	Alarming
Defaulter rate	30.9%	< 15%	> 25%	Alarming
Mean length of stay	8.9 days	< 4weeks	> 6weeks	

Table 3: Outcome indicators vs Reference, Asella Referral teaching Hospital, Asella, Ethiopia, June 2016.

Variable	Cured No (%)	Correlated treatment out come				
		Died No (%)	Defaulted No (%)	Others No (%)	Total No (%)	
SAM Admission	New	53 (33.1)	10 (6.3)	29 (18.1)	68 (42.5)	160 (100)
	Repeat	1 (14.3)	1 (14.3)	4 (57.1)	1 (14.3)	7 (100)
	Total	54 (32.3)	11 (6.6)	33 (19.8)	69 (41.3)	167 (100)
Age of Admitted SAM case	< 6 month	15 (38.5)	5 (12.8)	7 (17.5)	12 (30.8)	39 (100)
	6 - 11 month	9 (22.5)	4 (10)	7 (17.5)	20 (50)	40 (100)
	12 - 23 month	14 (31.8)	2 (4.5)	7 (15.9)	21 (47.7)	34 (1000)
	24.59 month	20 (35.7)	2 (3.6)	14 (25)	20 (35.7)	56 (100)
	Total	58 (32.4)	13 (7.3)	35 (19.6)	73 (40.8)	179 (100)
Length of Stay in inpatient	< 4week	55 (33.3)	11 (6.7)	32 (19.4)	67 (40.6)	165 (100)
	4 - 6 week	3 (37.5)	2 (25)	1 (12.5)	2 (25)	8 (100)
	> 6 week	0 (0)	0 (0)	2 (33.3)	4 (66.7)	6 (100)
	Total	58 (32.4)	13 (7.3)	35 (19.6)	7. (40.8)	179 (100)

Table 4: Cross tabulated of Admission criteria, age of patient and Length of stay with treatment outcome, Asella Referral teaching Hospital, June 2016.

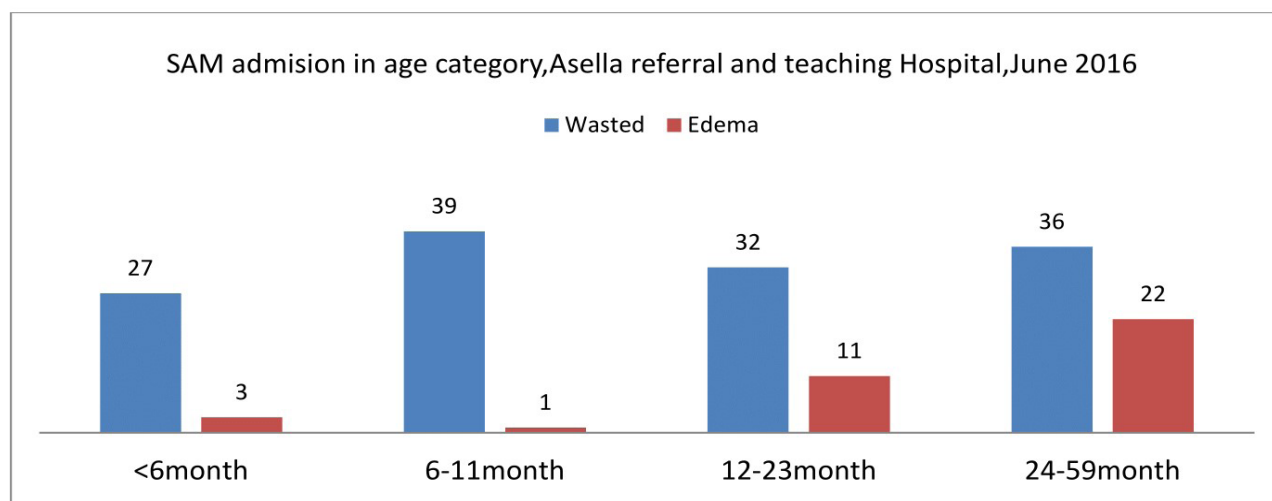


Figure 2: Admission relation to age category of patients admitted to Asella referral teaching hospital, June 2016.

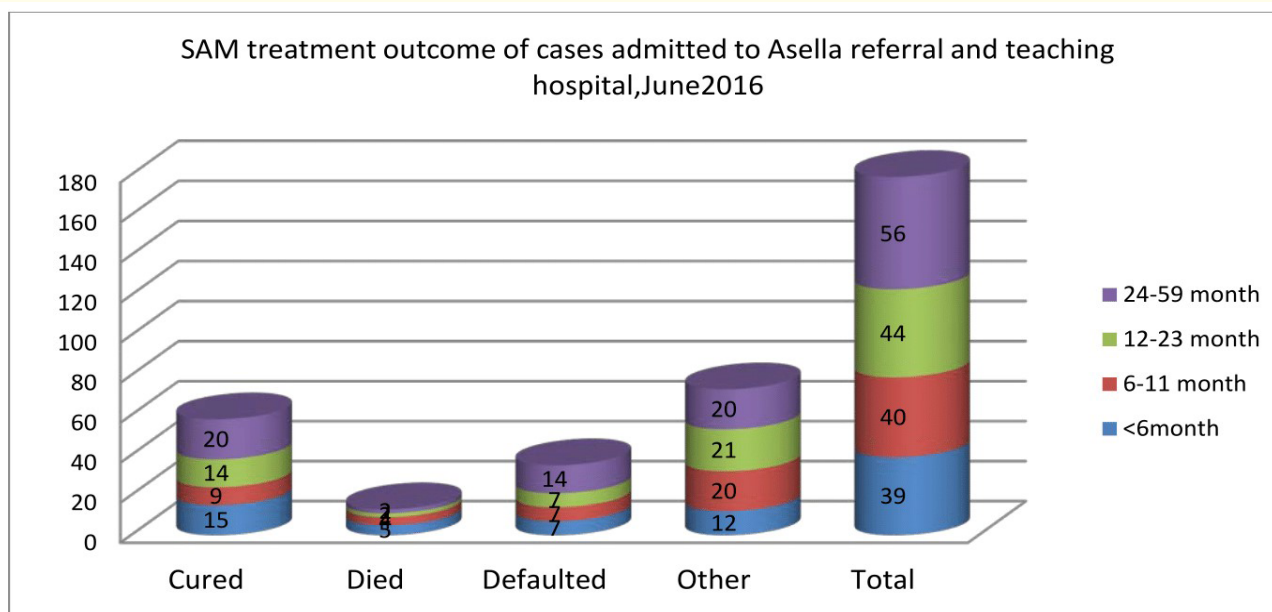


Figure 3: SAM treatment out come in Asella referral teaching hospital, June 2016.



Variable Recovered Number (%)		Treatment out Come		COR (95%CL)	AOR(95%CL)
		Died Number (%)			
Residence of SAM patient	Rural	46	9	0.49 (0.08, 2.93)	
	Urban	5	2		
Sex of SAM Patient	Male	33	8	1.34 (0.38, 5.18)	
	Female	23	4		
Age of SAM patient	< 6 month	18	5	1.39 (0.39, 4.84)	3.15 (2.71, 6.23)*
	> 6 month	40	8		
Admission	New	53	10	0.19 (0.01, 3.27)	1.23 (2.71, 4.62)*
	Repeat	1	1		
Admission Criteria	marasmus	32	8	0.80 (0.69, 0.94)	
	Edema	11	0		
Distance from Hospital	< 50 km	43	0	1.87 (1.32, 2.64)***	2.13 (3.34, 5.16)**
	> 50 km	15	13		
Length of Stay in Hospital	< 4 wk	55	11	0.30 (0.05, 2.01)	
	> 4 wk	3	2		

**Table 5:** Factors associated with treatment outcome of SAM patient admitted to Asella Referral Teaching Hospital, June 2016.

*P-Value < 0.05, \*\*\* P-value < 0.0001, \*\* P-value < 0.01, \* P-value < 0.05*

### Conclusion

In Asella Referral and teaching hospital, severe acute malnutrition management outcome were below acceptable Sphere standard. Low recovery rate, increased death rate and defaulter rate were also high. This poor treatment outcome needs consideration early identification and management of Severe acute malnutrition following national protocol may lacking.

### Recommendations

- Strengthening Community based management of acute malnutrition at PHCU Health Posts and health centers is important for managing acute malnourished cases before complication developed.
- Adequate care for admitted severe acute malnutrition cases to decrease Mortality, and Defaulter and increasing Cure rate.
- Training adequate number of health staff at hospital level on Severe acute malnutrition protocol
- Admission and SAM case management according to the WHO and National guide line.

### Limitation

Since the study is retrospective document review, thus monitoring by health workers not assessed. And Knowledge, skill of health workers not analyzed.

### Conflict of Interest

The Author declare that there is no conflict of interest.



### Authors Contribution

Sintayehu Bedada, a Health and Nutrition Specialist, working as program manager, Researcher and Consultant on Health and Nutrition, performed the study design, Data Collection analysis and interpretation This research article conceived the study.

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