

Magnitude and Treatment Outcome of Severe Acute Malnutrition of 6-59 Months Children in Raya Alamata Woreda, Tigray Region, Ethiopia from 2011-2015

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To cite this article:

Zerihun Degebasa, Taklu Marama, Alefech Addisu. Magnitude and Treatment Outcome of Severe Acute Malnutrition of 6-59 Months Children in Raya Alamata Woreda, Tigray Region, Ethiopia from 2011-2015. *Science Journal of Public Health*. Special Issue: Malnutrition in Developing Countries. Vol. 5, No. 5-1, 2017, pp. 30-37. doi: 10.11648/j.sjph.s.2017050501.16

Received: October 25, 2017; **Accepted:** October 29, 2017; **Published:** November 24, 2017

Abstract: Background: Globally, 4% death burden and 25 to 35 million attribute to severe acute malnutrition. One million death burden and 13 million attributable to severe acute malnutrition in sub Saharan Africa whereas 3% was severe wasting in Ethiopia. Objective: To describe the magnitude and treatment outcome of severe acute malnutrition of aged 6-59 months children in Raya Alamata woreda, southern zone of Tigray Region from 2011 to 2015. Methods: Retrospective record review of five years (2011-2015) aged 6-59 months old children of severe acute malnutrition data was conducted in Raya Alamata woreda which is found in southern zone of Tigray Region. Malnutrition extraction form tool was used to extract data from records and data was analyzed pertaining with variables time, place and person by Microsoft excel of 2010. Result: During the study period, 2009 total admissions of severe acute malnutrition cases identified. Two deaths with a case fatality rate of 0.26% were reported from Outpatient therapeutic program and Establishing center. About 1856 (92.4%) of the total Severe acute malnutrition cases were new admissions. Incidence rate of new admission with the magnitude of 39 cases per 1000 population per year in 2011 and decreased from 41 in 2012 to 17 cases per 1000 population per year in 2015. Of new admission of severe acute malnutrition, 10.2% cases admitted by edema in 2011. Age-specific cure rate of 6-59 months decreased 91.3% in 2011 to 90.2% in 2015 and defaulter rate decreased from 10.3% in 2011 to 0% in 2015 with non-responder 3.4% in 2011 to 0% in 2015. Conclusion: Death rate was almost Zero except fatality rate in 2013 which is 0.26%. Therapeutic feeding program admissions were increased from 2011 to 2012 and decreased to 2015. The case management of severe acute malnutrition and community based Nutrition program should be strengthened.

Keywords: Severe Acute Malnutrition, Data Analysis, Raya Alamata

1. Introduction

Nutritional status is the result of complex interactions between food consumption and the overall status of health and health care practices. Numerous socioeconomic and cultural factors influence patterns of child feeding and nutritional status of women and children [1]. Acute Malnutrition is classified into severe acute malnutrition [2] and moderate acute Malnutrition (MAM) according to the

degree of wasting and the presence of edema. It is severe Acute malnutrition if the wasting is severe weight-for-height less than 70% of national children health statistics (W/H < 70% National Children Health Statistics (NCHS) median or a low Mid-upper arm circumference (MUAC)) or there is edema. Moderate acute malnutrition defined as, if the wasting (W/H is between 70% and 80% NCHS median)

or have a mid-upper arm circumference (MUAC) of between 11.0 cm to 11.90cm [3].

Malnutrition remains one of the most common causes of morbidity and mortality among infants and children throughout the world [4]. Malnutrition is the largest single underlying cause of death worldwide and is associated with over 1/3 of all childhood deaths. Malnutrition is an underlying cause of the death of 2.6 million children each year. Every hour and minute of every day, 300 and 5 children die because of malnutrition respectively. In the world today, one child in four is stunted due to malnutrition, and in developing countries this figure is as high as one in three and specifically in Africa two out of five children's will suffered with malnutrition [5]. With 4% of the global death burden in children under five attributable to SAM and 14.5% attributable to global (moderate and severe) wasting. These children have a greater than nine fold increased risk of dying compared to a well-nourished child [6].

Globally about 25 to 35 million under-five children have severe acute malnutrition [2] and 13 million of these children live in sub-Saharan Africa. Severe acute malnutrition is characterized by wasting (marasmus), edema (as a result of kwashiorkor), or both (marasmus kwashiorkor), and occur mostly in children. The worst affected in Africa are, west, central and eastern Africa [5, 6]. The magnitude of wasting is substantial and persistent in the Sub-Saharan Africa including Ethiopia where many children are suffering from the effects of acute malnutrition [7]. Malnutrition at the early stages of life can lower child resistance to infections, increase child morbidity and mortality, and decrease mental development and cognitive achievement [8].

Ethiopia being one of the countries which malnutrition is an important public health problem; stunting, underweight and wasting were identified as 44%, 29% and 10% [9]. In Ethiopia despite recent economic progress; nutritional status of children is among the worst in the world and it remains major public health problem. According to recently published Ethiopian mini demographic and health survey 2014 report; 9% of children are wasted (3% severely wasted) in the country [10]. In Tigray regional state of Ethiopia the percentage of children who are severely stunted, severely wasted and severely underweight is 22.4%, 3%, and 9.8% respectively [11]. This research aimed to describe the Magnitude and treatment outcome of severe acute malnutrition in Raya Alamata woreda, Tigray Region, Ethiopia from 2011 to 2015

2. Methods

Study area:

This surveillance data analysis on severe acute malnutrition was conducted in Raya Alamata Woreda, Southern zone, Tigray Region. Raya Alamata woreda is one of the five rural woreda located in southern part of Tigray Region, 180 km far away from the capital city of the region,

Mekelle. It is Part of the southern Zone which is bordered by the Amhara Region to south and west, by Ofla to the Northwest, and by Raya Azebo to North east. The woreda has an altitude which ranges between 1178 to 3148 meters above sea level.

Study Design:

Retrospective record review of severe acute malnutrition pertaining variables of person, time, and place was done

Study Period:

Secondary data of SAM was collected, analyzed and interpreted from Jan 25 - Feb. 25/2016.

Study population:

The study population is all severe acute malnutrition aged 6-59 months of children registered and reported in the woreda for next level.

Inclusion: Severe acute malnutrition aged 6-59 months of <11cm MUAC or edema or both, of children between 2011 to 2015.

Exclusion: severe acute malnutrition of aged 6-59 months of <11cm MUAC or has edema or both children before 2011 and after 2015.

Data collection procedures

Retrospective data of acute malnutrition for the last consecutive five years was obtained from woreda Regional Public Health Emergency Management and Maternal and child Health databases using malnutrition extraction form / checklist. Additionally, Weekly hard copy of SAM reports that comes from different Health facility of woreda health office was reviewed.

Data Analysis Procedure

The collected data was compiled and analyzed using Microsoft Excel 2010. Frequency & percentages were calculated.

Ethical consideration

Permission was obtained from Mekelle University, collage of Health science, school of Public Health, and official consent were also granted from Tigray Regional Health Bureau. During data collection period, the purposes and importance of the study was discussed with woreda head and experts.

Operational definitions

Severe Acute Malnutrition: Children age from 6 months to 59 months with MUAC less than 11cm and/or children with bilateral edema regardless of their MUAC.

Malnutrition: It is the condition that results from an imbalance between dietary intake and requirements [12].

Cluster: political demarcation of one health center including five mobile health posts.

3. Results

During the study period, a total of 2009 admissions of severe acute malnutrition were observed. 1958 (97.5%) cases identified at a program of Outpatient Therapeutic Program (OTP) and 50 (2.5%) were at Stabilization center (SC) programme in Raya Alamata Woreda (figure 1).

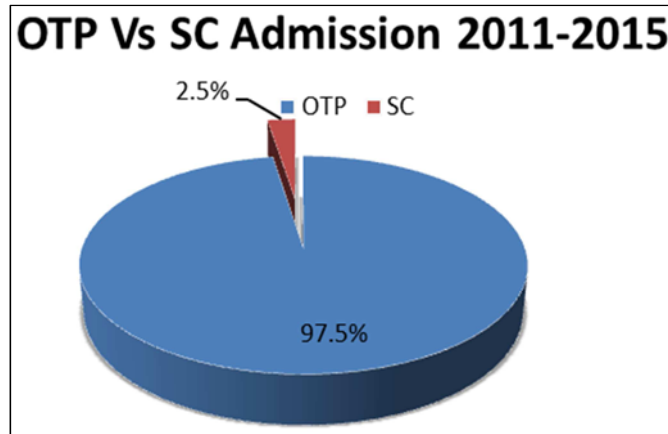


Figure 1. Total admissions of SAM at OTP and SC programs in Raya Alamata Woreda, Tigray Region, Ethiopia from 2011-2015.

Incidence proportion of new admissions of SAM with the magnitude of 39 cases per 1000 population in 2011, Increased to 41 cases per 1000 population in 2012. But, it decreased to 17 cases per 1000 population in 2015 year (figure 2).

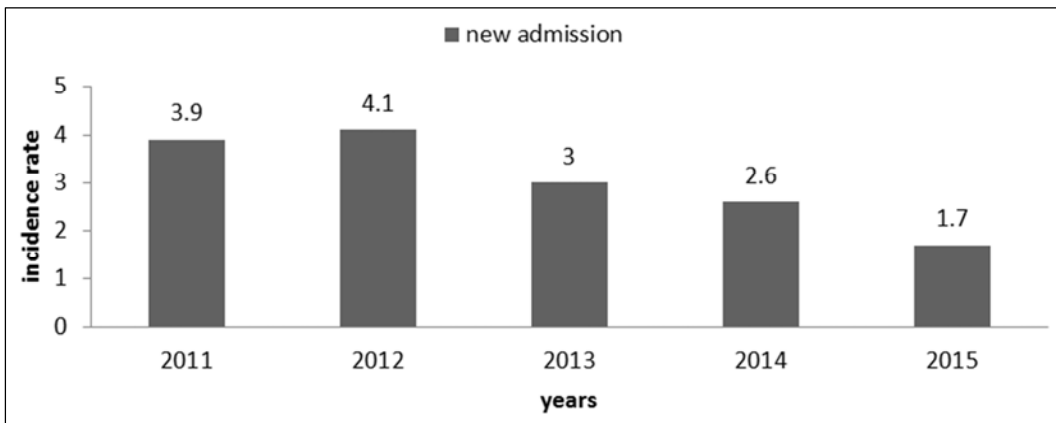


Figure 2. Incidence proportion of Severe Acute Malnutrition in Raya Alamata Woreda, Tigray Region, Ethiopia from 2011 – 2015.

Of the five health center cluster of the woreda, Incidence proportion (risk) of SAM in Waja Cluster consistently decrease from 2012 year to 2015 year and in Gerjelle and S/Wuha start decrease consistently from 2013 year. However, in Tumuga and Merewa not consistently decreased (figure 3).

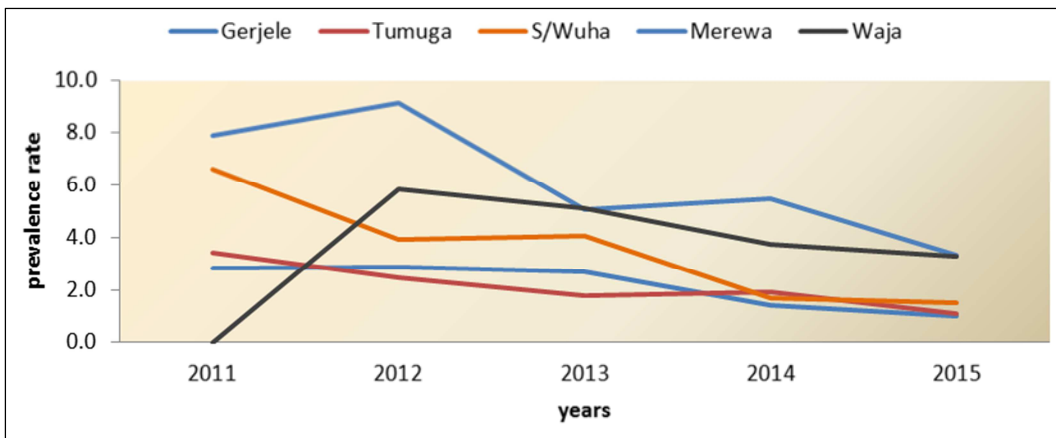


Figure 3. Trends of SAM by HC cluster in Raya Alamata Woreda, Tigray Region, Ethiopia from 2011-2015.

In study period it was understand that cases of malnutrition was high between Septembers to November (spring season) months of the year from each year of data analyzed. Of cases admitted to SC, six cases admitted in 2012 year at the month of September. Despite the fact that cases admitted to SC were decreased from 19 in 2012 to 3 in 2015 year (figure 4)

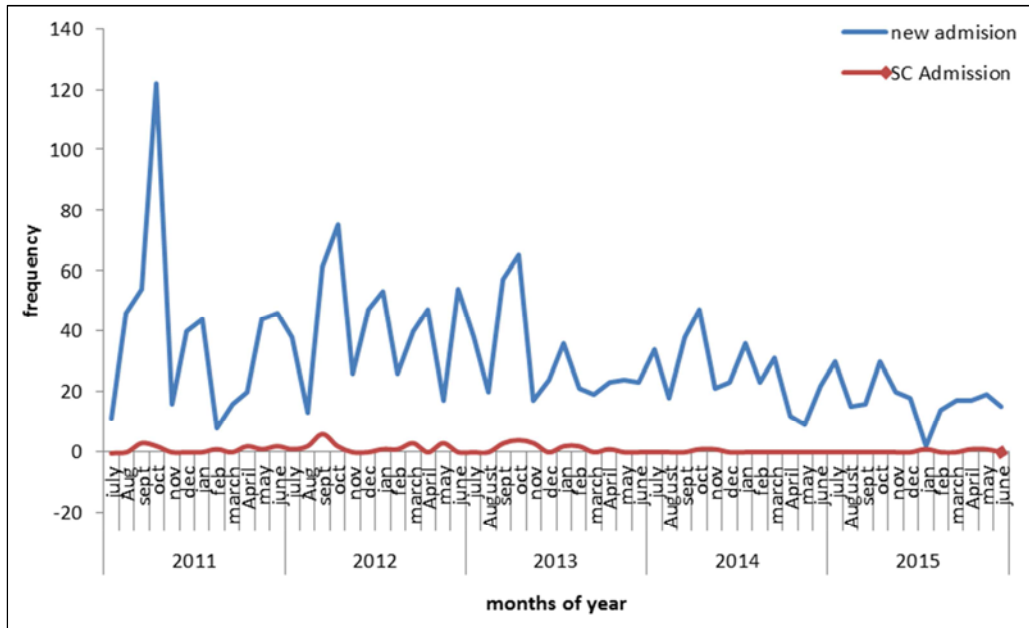


Figure 4. Trends of new admissions & inpatient of SAM by months in Raya Alamata Woreda, Tigray Region, Ethiopia from 2011-2015.

Total new admission of severe acute malnutrition cases were increased 467 in 2011 year to 497 in 2012 year and decreased to 2013 in 2015 year (figure 5).

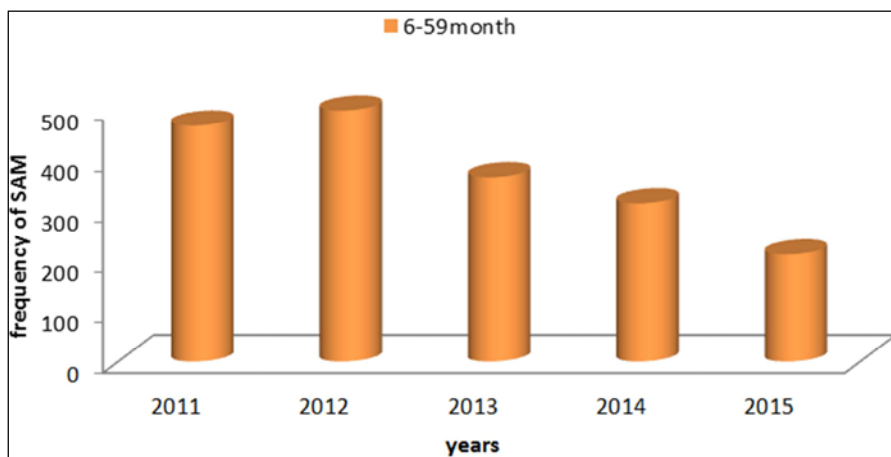


Figure 5. SAM of children aged 6-59 months by year in Raya Alamata woreda, southern zone, Tigray Region from 2011 - 2015.

Of the new admission of severe acute malnutrition 85.8%, 93.5% and 100% cases were admitted by MUAC in 2011, 2012 and 2015 years respectively. 10.2% of severe acute malnutrition admitted by bilateral edema in 2011 year and none of case is admitted by bilateral edema in 2015 year (figure 6).

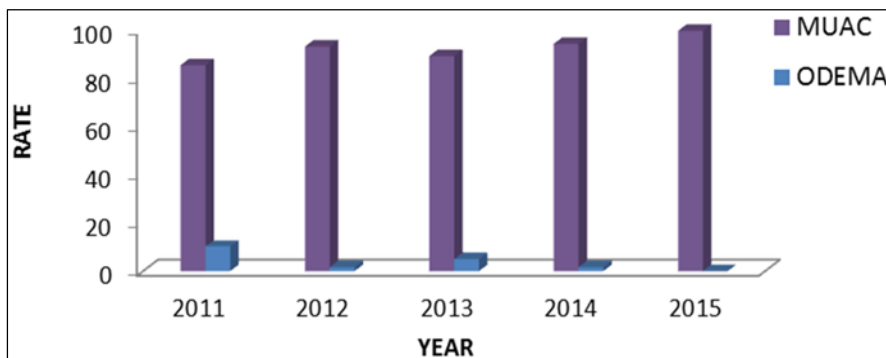


Figure 6. SAM Admissions by MUAC and Edema in Raya Alamata Woreda, Tigray Region, Ethiopia from 2011-2015.

As depicted in the below table, the highest prevalence of SAM cases per 1000 population was seen in Merewa cluster in 2012 year which was 91 followed by itself in 2011 which was 79 and S/Wuha 66 in 2011 year. The least prevalence was seen in Gerjelle cluster which was 10 cases per 1000

population in 2015 year.

In Waja cluster, prevalence was consistently decreased from 58 in 2012 to 33 in 2015 year which was above woreda prevalence rate (Table 1).

Table 1. Prevalence of SAM in children 6-59 months aged in different Health center cluster in Raya Alamata Woreda, Tigray region, Ethiopia from 2011- 2015.

| Cluster | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|----------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|
| | Total Admission | prevalence per 1000 | Total Admission | prevalence per 1000 | Total Admission | prevalence per 1000 | Total Admission | prevalence per 1000 | Total Admission | prevalence per 1000 |
| Gerjelle | 98 | 28 | 101 | 29 | 95 | 27 | 51 | 14 | 36 | 10 |
| Tumuga | 113 | 34 | 82 | 24 | 60 | 18 | 65 | 19 | 38 | 11 |
| S/Wuha | 98 | 66 | 60 | 39 | 62 | 40 | 26 | 17 | 23 | 15 |
| Merewa | 203 | 79 | 239 | 91 | 134 | 51 | 146 | 55 | 89 | 33 |
| Waja | 0 | 0 | 61 | 58 | 54 | 51 | 40 | 38 | 35 | 33 |
| Woreda | 512 | 43 | 543 | 45 | 405 | 33 | 328 | 20 | 221 | 18 |

Prevalence rate of 2011 year (4.3%) was exceeded by 0.2% prevalence of 2012 year (4.5%) and consistently downward trends of SAM prevalence rate from 2012 to 2015 year which prevalence rate was 1.8% in 2015 (figure 7).

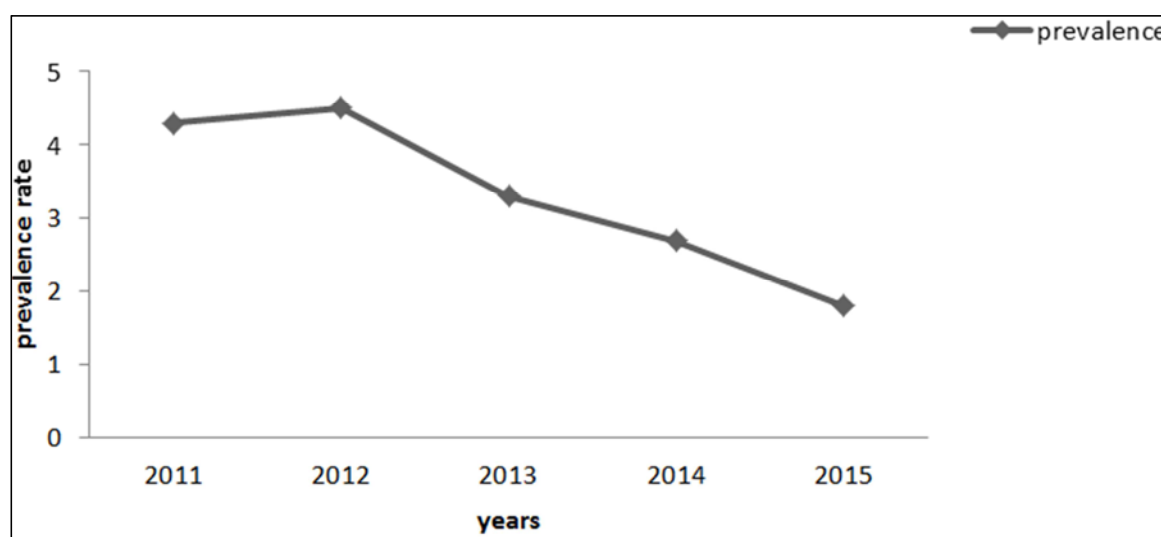


Figure 7. Trends of prevalence rate of SAM in Raya Alamata Woreda, Tigray Region, Ethiopia from 2011-2015.

The main outcome indicators were cure rate, death rate, defaulter rate, non-responder rate and unknown status. In study period of years, recovery rate decreased from 91.3% to 90.2%, Defaulter 10.3% to 0 and non-responder 3.4% to 0% decreased from 2011 to 2015 year respectively.

Table 2. Comparison of the treatment outcomes of severely malnourished children with International SPHERE Standards in Raya Alamata Woreda, Tigray Region, Ethiopia from 2011-2015.

| Outcome indicators | outcome (%) through the year | | | | | International SPHERE standards | |
|--------------------|------------------------------|------|------|------|------|--------------------------------|----------|
| | 2011 | 2012 | 2013 | 2014 | 2015 | Acceptable | Alarming |
| Recovery Rate | 91.3 | 55.7 | 45.5 | 66.6 | 90.2 | >75% | <50% |
| Non-Responder | 3.4 | 0.07 | 2.6 | 3.4 | 0 | <15% | - |
| Case fatality rate | 0 | 0 | 0.3 | 0 | 0 | <10% | >15% |
| Defaulter rate | 10.3 | 2.7 | 2.2 | 3.1 | 0 | <15% | >25% |
| Unknown | 0.8 | 0.4 | 0.4 | 0.2 | 0 | - | - |

Of the total admissions in 2011 year, 91.3% of them were confirmed as age-specific cure rate and decreased to 90.2% in 2015 year. In 2011, 52 cases were reported as defaulter. Two deaths which 0.26% CFR were occurred at 2013 year

which one reported from Merewa Health center in September and other one death was reported from Gerjelle health center cluster in October 2013 (Figure 8).

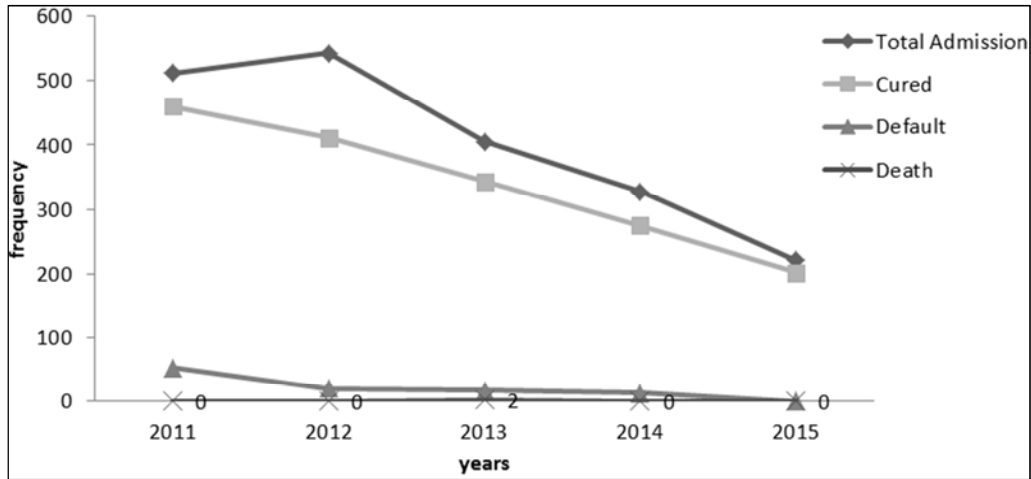


Figure 8. Trends of total admissions, cured, Defaulter and Death of SAM in Raya Alamata Woreda, Tigray Region, Ethiopia from 2011-2015.

Through the year as Admission cases decrease 512 to 221 also Defaulter decrease 52 to 0 from 2011-2015 year respectively (figure 9).

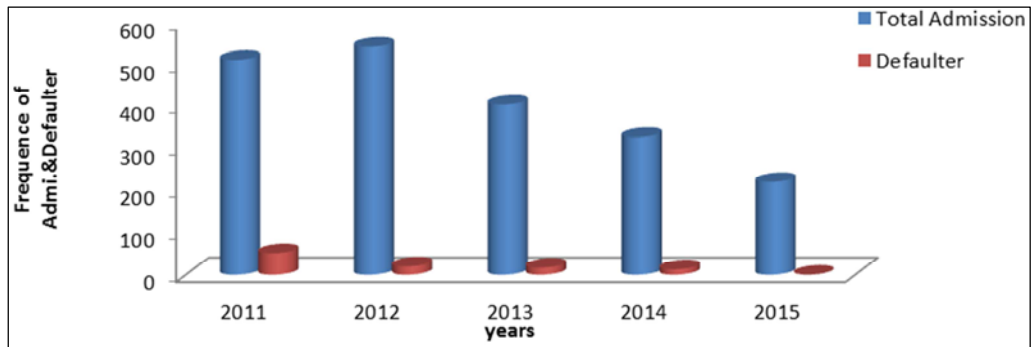


Figure 9. Total admissions and defaulters of SAM in Raya Alamata Woreda, Tigray Region, Ethiopia from 2011-2015.

4. Discussion

Generally, Our data analysis indicated that annual prevalence was increased to 45cases per 1000 population in 2012 from 43cases per 1000 population in 2011 and decreased to 20 cases per 1000 population in 2014 from 33cases per 1000 population in 2013 and again decreased to 18 per 1000 population in 2015. The highest number of cases 45 per 1000 population were reported in 2012 and treatment outcome was exist within interval of acceptable International SPHERE standards.

In Ethiopia as well as in other developing countries, malnutrition among children is a major health problem [13]. The findings of this study revealed that the children 6-59 months old aged group, 97.5% were admitted by OTP programme.

Children aged 6-59 months were highly suffered from severe acute malnutrition. The proportion of malnutrition is highest in the age group of 24-35 months (34%) and lowest among those under six months (10%) children [9]. This can be correlated with that of children's are unable to prepare their food intake by themselves, low immunity and high participation rate on SAM screening due to the Federal Ministry of Health (FMOH) policy focused in these age

group. This may be explained that foods for weaning are typically introduced to children in the older age group, thus increasing their exposure to infections and susceptibility to illness.

Our study display about 91.8% SAM cases were admitted by MUAC measurement and 4.3% were admitted due to presentation of edema and 3.9% relapse. This in line with study conducted in Burkina Faso that indicated about 94.7% admitted based on MUAC alone, With the remaining 3.8% were admitted based on edema and 1.5% were admitted based on other special case [14]. This indicates that most of the children admitted were Marasmus (MUAC<110 mm without edema) which agree with study done in Northern Ghana that designate marasmus is more prevalent than kwashiorkor [15].

From study period data, occurrence of SAM cases were high starting from September to November. It Might be due to harvesting time, mothers used to leave their small children at home with the older siblings who might not be competent to look the children, even in the presence of food in the household. It is divergence with study done in Ghana Tamale Teaching Hospital which indicate that the peak months for admission over the three years period were June to September and highest number of admission is recorded in

the last number of cases was admitted in March [15]. This contrast might be due to study period, Socio economic characteristics, Geographic characteristics, seasonal pattern as well as study area.

Prevalence rate of SAM in this study area were ranging from 2 to 5% in previous consecutive five years compared to the current nutrition situation of Global acute malnutrition and severe acute malnutrition [2] with a prevalence ranging from 7.7 to 23.4% and 2.0 to 4.5% percent respectively.

Data Analyzed indicates that recovery rate was less than 50% in 2013 and greater than 75% in 2011 and 2015 years. Defaulter rate was also decreased from 10.3% in 2011 to 0% in 2015 years. Death rate was almost nil except fatality rate in 2013 which is 0.26%. Recovery rate in this study area was outside of acceptable range (alarming) when compare with Global Sphere standards (<50%) in 2013 year and Acceptable range in 2011 and 2015 years. Also other treatment outcome was in acceptable range when related with Global Sphere standards. This improvement gained may be due to treatment of SAM has been decentralized from health centers to health post level, much closer to communities. This finding of treatment outcome was in line with report of concern worldwide in Tigray region revealed that the cure rate increased, defaulter rate and death rate decreased in 24 woreda including Raya Alamata from 2011 – 2013 years. Defaulter rates reduced from 12.8% in 2011 to 5.3% in 2013 and cure rates were above 75% in 2012 year [16].

5. Limitations/Gaps

1. Number of Outpatient Therapeutic Program and Stabilization center through the year is not documented.
2. Woreda Regional Public Health Emergency Management unit did not compile and analyze SAM reports regularly.
3. SAM report format is not including sex (male & female).

6. Conclusion

According to the findings of this study, prevalence of severe acute malnutrition relatively show decrement trends over the last five years in Raya Alamata Woreda, Southern zone of Tigray Region. Treatment outcome (defaulter, non-responder and unknown status) decreasing yearly from 2011 to 2015 and Deaths were nil except 2013 year.

Recommendations

1. Reports should be compiled and analyzed timely at all level to understand disease trends and take action.
2. Screening of SAM cases and management should be enhanced at all levels of health facility.
3. Woreda health office with collaboration of other partners should Strengthen community based nutrition
4. A capacity building is required for health workers and Health Extension workers to increase their participation

rate of SAM screening of the children.

5. OTP and SC site should be documented and cases also segregated by sex.

Conflict of Interests

The authors declare no conflict of interests.

Authors' Contribution

ZD has conceived the study, participated in the design of the study and performed statistical analysis, and helped to draft the manuscript. TM involved in design and analysis of the study, drafting the manuscript for important intellectual content, drafting the article or revisiting it critically for important content. AA Has guided overall stage of the research, implementation, and analysis of this study.

Acknowledgements

First of all we would like to thank head of Raya Alamata Woreda Health office, Sr Genet G/Libanos for her assistance and facilitation. We also thank Public Health Emergency Management Core Manager at Tigray Regional Health Bureau for his significant contribution through facilitation of field works. Finally but not least we will take the opportunity to thank all Raya Alamata woreda Health office staffs for their technical assistance. Furthermore, we would like to forward our gratitude to Dr. Alemayehu Bayray for his professional and technical guidance and encouragement.

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