

Prevalence and Associated Factors for Protein Energy Malnutrition Among Children Below 5 Years Admitted at Jinja Regional Referral Hospital, Uganda

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Research

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- 1. PREVALENCE AND ASSOCIATED FACTORS FOR PROTEIN ENERGY**
- 2. MALNUTRITION AMONG CHILDREN BELOW 5 YEARS ADMITTED AT JINJA**
- 3. REGIONAL REFERRAL HOSPITAL, UGANDA.**

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16. ABSTRACT

17. Background

18. Undernutrition immensely contribute to the death of almost half of the children under 5
19. years, translating into the loss of about 3 million young lives a year. In developing
20. countries, penultimate to hunger that constitute to the death of most children, Protein
21. Energy Malnutrition (PEM) amongst other factors account for the death of 49% of children
22. below the age of five. Due to incessant increase in poverty level in Uganda, Jinja District
23. five-year development plan of 2011 was designed to curb menace posed by malnutrition
24. not only on children but also adults in this district. The objective of this study is to assess
25. the prevalence and factors associated with PEM among under-fives admitted in the
26. paediatric wards of Jinja Regional Referral Hospital (JRRH).

27. Methods

28. To carry out this study, a descriptive questionnaire-based and facility-based cross-sectional
29. study design was used which will apply both qualitative and quantitative approaches. The
30. study involved a sample size of 364 with the study population being under-fives admitted
31. in the paediatric wards of JRRH between March and August 2019.

32. Results

33. Results of this study shows that 52 out of 364 admissions were due to PEM giving a
34. prevalence of 14.29%, males being affected more than females, with suboptimal
35. immunization history. Children aged between 12 – 24 months contributed the highest
36. (34.62%) cases of PEM and most are living in rural areas with low family socio-economic
37. status and poor breastfeeding and feeding practices. The under-five PEM case-fatality rate
38. was 2% (1 out of 52).

39. Conclusion

40. In conclusion, both the prevalence and case fatality rates of under-five PEM were high,

41. calling for appropriate interventions based on the associated factors.

42. Keywords: Protein-energy malnutrition; Case-fatality rate; Under-fives

43. BACKGROUND

44. The World Health Organization (WHO) defines Malnutrition as “the cellular imbalance

45. between the supply of nutrients and energy and the body's demand for them to ensure

46. growth, maintenance, and specific functions” [1]. Malnutrition is the condition that

47. develops when the body does not get the right amount of the vitamins, minerals, and other

48. nutrients it needs to maintain healthy tissues and organ function. Malnutrition remains a

49. major global public health challenge, especially among children under five years of age

50. [2]. One form of malnutrition that affects children is Protein Energy Malnutrition (PEM).

51. The term protein-energy malnutrition applies to a group of related disorders that include

52. marasmus, kwashiorkor, and intermediate states of marasmic-kwashiorkor which arise

53. primarily as a result of a “food gap” between the intake and requirement [3]. PEM is

54. considered the primary nutritional problem and is also known as the First National

55. Nutritional Disorder. Therefore, it is important for the health system to detect Protein

56. Energy Malnutrition at an early stage for planning and implementing timely interventions

57. at all the effective levels.

58. Protein energy malnutrition (PEM) is a major public health problem in Uganda and other

59. developing countries especially in Sub – Saharan Africa. Sub –Saharan Africa has a

60. prevalence of under-nourished children second only to India [4]. Every year, approximately

61. 2.3 million deaths among under 59 months aged children in developing countries are

62. associated with malnutrition, which is about 41% of the total deaths in this age group [5].

63. Undernutrition puts children at greater risk of dying from common infections, increases the

64. frequency and severity of such infections, and contributes to delayed recovery [6]. The

65. interaction between undernutrition and infection can create a potentially lethal cycle of

66. worsening illness and deteriorating nutritional status [7]. Poor nutrition in the first 1,000

67. days of a child's life can also lead to stunted growth, which is associated with impaired

68. cognitive ability and reduced school and work performance [8]. Approximately 45% of all

69. deaths in children under five years were associated with malnutrition. This further

70. underpins the impact of malnutrition on child survival [9].

71. Development of PEM is associated with several risk factors, among which are Socio-

72. economic status, biological factors, environmental factors, role of free radicals, age of the

73. host etc. Some of the socio-economic, biological and environmental factors includes, lack

74. of breast feeding and giving diluted formula, improper complementary feeding,

75. overcrowding and poor child-spacing in family, ignorance, illiteracy, lack of health

76. education (awareness), poverty, concomitant infections, familial disharmony among others

77. [10]. PEM can also develop in pregnant and lactating mothers which can in turn affect the

78. growth, nutritional status and survival rates of their foetuses, new-borns and infants [11].

79. The number of malnourished children in Busoga is on the increase; records at Jinja referral

80. hospital has shown four (4) out of the ten (10) children admitted at the hospital are severely

81. malnourished [12]. To combat the problem of protein-energy malnutrition in this

82. community, risk factors associated with it must be identified. However, there is dearth of

83. information on the risk factors associated with the cases reported at the Jinja regional

84. referral hospital, Uganda.

85. Therefore, the aim of this study is to determining the case fatality rate and the various
86. predisposing factors to development of PEM among children under five years of age
87. admitted in the paediatric wards of Jinja Regional Referral Hospital. This will provide the
88. necessary information on the prevalence of PEM within the study area and help channel
89. towards finding the lasting solution to this problem.

90. METHODOLOGY

91. Study design

92. A descriptive facility-based cross-sectional study design was used which applied both
93. qualitative and quantitative approaches.

94. Study area

95. The study was conducted at Jinja Regional Referral Hospital. Jinja Hospital is one of the
96. thirteen (13) Regional Referral Hospitals in Uganda. It is also one of the fifteen (15)
97. hospitals designated as Internship Hospitals, where graduates of Ugandan medical schools
98. may undergo a year of internship under the supervision of consultants and specialists in the
99. designated medical and surgical disciplines.

100. Study Population

101. The study population were all children below the age of five years admitted in the
102. paediatric wards of JRRH between March-August, 2019.

103. Inclusion and Exclusion criteria

104. All under-fives admitted in the Paediatric wards of JRRH within the time scope of
105. the study and whose caretakers offered consent were included in the study.

106. Meanwhile, all under-fives admitted in the Paediatric wards of JRRH within the
107. time scope of the study whose caretakers refused to offer consent were excluded.

108. Sampling Procedures

109. Consecutive sampling technique was used whereby study subjects were recruited
110. as they came and met the inclusion criteria.

111. Data Analysis

112. Data was entered into Microsoft excel 2016 professional spreadsheets and analysed
113. using SPSS version 17.0. Data analysis was done as per objective; descriptive
114. statistics in form of percentages, charts, tables and graphs with univariate, bivariate
115. and multivariate analytical methods being employed.

116. RESULTS

117. Demographic characteristics of study population

118. As shown in Table 1, The demographic feature of participants included female
119. (58.24%) and male (41.76%). 37.91% of the under-fives admitted to the paediatric
120. ward at JRRH were aged between 25 and 36 months, followed by those above 36
121. months (28.57%), 12 -24 months (23.08%) and the least is <12 months old
122. (10.44%). Most (58.79%) of the admitted under-fives were under the care of their
123. mothers followed by those under the care of their aunt (28.02%), sister (11.54%) or
124. grandmother (1.65%).

125. PREVALENCE OF PROTEIN ENERGY MALNUTRITION AMONG
126. UNDER-FIVES

127. As shown in Table 2, 52 (14.29%) of the total admissions were due to protein
128. energy malnutrition while 312 (85.71%) were well nourished. It is evident that
129. children aged between 12 – 24 months contributed the highest cases of PEM
130. (34.62%), followed by those aged 25 – 36 months (26.92%) and then those above

131. 36 months (23.08%). The least number of PEM cases was seen in those aged below
132. 12 months (15.39%).

133. FACTORS ASSOCIATED WITH UNDER-FIVE PEM AT JRRH

134. Immunization history and under-five PEM

135. The Children not being fully immunized were found associated with increased
136. cases of PEM as shown in Table 3. Child's immunization status was found to be
137. of great importance as high number (271) of children that did not suffer from PEM
138. were fully immunized.

**139. Breastfeeding and Feeding practices in association to under-five PEM at
140. JRRH**

141. As shown in Table 4, exclusive breastfeeding (RR: 0.2151), breastfeeding on
142. demand (RR: 0.6114), feeding on specially prepared feeds (RR: 0.3249) and
143. separately from the other siblings (RR: 0.6487) were found to be associated with a
144. reduction in PEM cases. However, Age at weaning (P-value: 0.9317), total
145. breastfeeding duration (P-value: 0.4152) and number of daily feeds (P-value:
146. 0.6474) were found to be of no statistical significance in as far as under-five PEM
147. was concerned. Though, those having only two feeds per day were found to be more
148. affected by PEM (44.23%) than those with more meals per day. Cow milk, beans,
149. vegetable soup, porridge, banana and matoke mash were the common feeds at
150. weaning.

151. Family-social characteristics and under-five PEM at JRRH

152. As shown in table 5, most families had between 2 to 4 siblings in a household
153. (58.79%), under the care of their married parents (78.85%), peasant (76.65%), aged

154. between 25 and 29 years (34.07%), and who lived in a rural area (82.42%), on an
155. average monthly income of between 100,000 – 500,000 UGX (67.31%) and
156. monthly food expenditure of 50,000UGX or more (93.68%).
157. However, Urban residence (RR: 0.7952) and Caregiver’s occupation (P-value:
158. 0.0394) were found to be statistically significant in as far as association with under-
159. five PEM was concerned whereas number of siblings (P-value: 0.8083), caregiver’s
160. age (P-value: 0.8840), caregiver’s marital status (P-value: 0.43231), family
161. monthly income (P-value: 0.9366) and monthly food expenditure (P-value:
162. 0.7474) showed no statistical significance.

163. CASE FATALITY OF UNDER-FIVE PEM CHILDREN

164. Over the study period, only a single fatality attributable to PEM and/or its
165. complications was recorded as shown in Figure 1. This gave a PEM case-fatality
166. rate of 2%.

167. DISCUSSIONS

168. Prevalence of Protein Energy Malnutrition in under five children showed 52 out of
169. the 364 study participants had PEM (14.29%). These findings support earlier
170. reports that malnutrition is still a big problem in sub of Saharan countries [13]. The
171. study also agreed with the findings of [14] and [15]. However, the result got from
172. this research is slightly lower than prevalence level of 30% reported by [16]. The
173. result may be attributed to the effectiveness of measures put in place to combat
174. malnutrition in the recent past [17]. Otherwise, it may also vary as a result of
175. regional variation in economy, agricultural practice or food security within Uganda
176. [18].

177. The relationship between child sex of PEM in under-five children showed that
178. males (7.70%) under-five children suffer from PEM compared to females (6.59%).
179. This sex difference was also reported by [19], they observed that Tanzanian under-
180. five males were more affected by PEM than their female counterparts. Similarly,
181. [20] reported that males were worse hit by PEM in Egypt than females. This male
182. predilection could be due to the fact that male children take part in playful activities
183. that demand and expend more energy compared to female children [21].

184. Poor immunization history was also found to be associated with increased rates of
185. PEM. This was similar to the findings of [22] in Bugando Medical Centre in
186. Mwanza Tanzania. Studies have shown infections to not only be consequences of
187. malnutrition, but can also be a major cause [6].

188. This study also showed that poor breastfeeding / feeding practices are significantly
189. associated with under-five PEM as observed in the children that were not
190. exclusively breast fed (RR = 0.2151) and not fed on demand (RR = 0.6114). The
191. result was in agreement with the findings of [23] that reported PEM to be a result
192. of suboptimal breastfeeding and feeding practices. It goes without saying that
193. reduced supply is the direct cause of PEM in this case.

194. Residence was also shown to hold statistical significance [RR = 0.7952] in PEM
195. with rural residence being associated with increased PEM rates. This result agreed
196. with the findings of [24] that observed that better nutritional status of urban children
197. is probably due to the cumulative effect of a series of more favourable
198. socioeconomic conditions, which, in turn, seems to lead to better caring practices
199. for children and their mothers. Despite not statistically significant (P-Value =

200. 0.936552) low monthly income (less than 100,000 UGX) and low monthly
201. expenditure on food (less than 50,000 UGX) was associated with higher rates of
202. PEM.
203. Fatality attributable to PEM or its complications was reported during the study
204. period. This gave an under-five PEM fatality rate of 2%. The fatality record of 2%
205. noticed in this study may be as a result of unforeseen constraints attributed to
206. malnutrition such as diseases. Single fatality recorded might also be indicative of
207. good and improved care provision by the health facility that curtailed more deaths
208. [25].

209. **CONCLUSIONS**

210. The prevalence of Protein Energy Malnutrition among under-five children admitted
211. at JRRH was high, which warrants immediate mitigating measures with associated
212. factors being suboptimal breastfeeding and feeding practices, age and sex of child,
213. poor immunization status, urban residence, caregiver occupation and financial
214. challenges. However, single case-fatality recorded in the course of this study calls
215. for proper intervention to completely eradicate PEM among under-five children.

216. **RECOMMENDATIONS**

217. The caregivers of under-five children should strictly adhere to exclusive
218. breastfeeding for at least 6 months since its benefits have been scientifically proven
219. beyond doubt. Also, the administration and staff of Jinja Regional Referral
220. Hospital should improve and/or scale-up existing community outreaches to educate
221. the community on the importance of exclusive breastfeeding, optimal child feeding
222. practices and childhood immunization in the fight against childhood malnutrition,

223. infections and deaths accompanied by intensive community childhood
224. immunization as per EPI stipulations and guidelines. Lastly, the Government of
225. Uganda through the Ministry of Health must intensify community awareness-
226. creation concerning childhood malnutrition, breastfeeding and feeding practices as
227. well as childhood immunization through available avenues such as audio-visual and
228. print media and continue support of these efforts both materially, financially and
229. staff empowerment.

230. DECLARATIONS

231. Ethical considerations

232. Compliance with ethical standards

233. Consent for publication

234. Consent to use and publish the data from this work was obtained from the
235. authorities of Jinja Regional Referral Hospital. Also, all authors have read and
236. approved the final manuscript.

237. Availability of supporting data

238. If requested by the publisher, data for this work is going to be provided

239. Competing interests

240. The authors declare that they do not have competing interests

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243. Acknowledgement

244. Not applicable

245. Authors' Contributions

246. LAM and SAS originated the work, LAM conceptualised the work while SAS
247. supervised the design, methods and writes the manuscript. SAA and YOF helped
248. with the critical review of the manuscript.

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344. Figure legend

	Number of Deaths
	Survivors

Figures

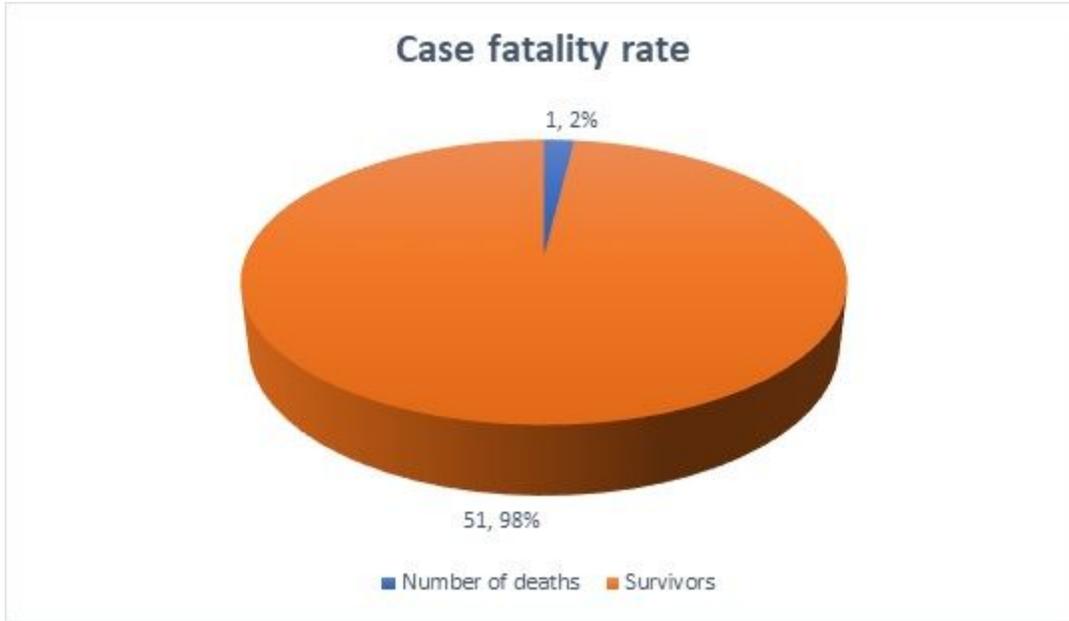


Figure 1

Deaths attributable to PEM and its complications at JRRH (N=52)