

Primary pyomyositis: Its socioeconomic effects; Community overview

ABSTRACT

Aims: To assess the community's views on the socioeconomic effects of primary pyomyositis to the patients, family, health facilities and community.

Study design: A cross-sectional study design using qualitative research methods

Place and Duration of Study: Gulu Regional Referral Hospital in Northern Uganda from September 2011 to November 2013.

Methodology: The study was conducted among patients with primary pyomyositis, next of kin, health workers and opinion leaders on their views about the socioeconomic effects of pyomyositis to their community. Key Informant Interviews, Focus Group Discussion and In-depth Interviews were used to obtain qualitative information. Ethical approval for the study was obtained from Gulu University IRB and the National Council of Science and Technology (UNCS&T). Thematic content analysis was used to analyze this qualitative data.

Results: Primary pyomyositis has several socio-economic effects to patients, family, health facilities and communities. The effects of the disease ranges from the disability it creates to inability to earn a living deepening the economic status/crisis of individuals, families and communities. It creates a series of social problems that make local leaders become less useful to their communities and also sets-in marriage related social problems. Education of the school going children are usually affected leading to school dropout.

Conclusion: There is a wide range of socio-economic effects of primary pyomyositis to the population of Northern Uganda and it presented with a number of socio-economic effects similar to those chronic diseases such as HIV/AIDS.

Keywords: Primary pyomyositis, Socioeconomic effects, Gulu, Northern Uganda.

1. INTRODUCTION

Diseases are a threat to social and economic development in developing countries and can lead to poverty, affecting particularly young people in their most productive age [1]. It weakens family and societal support systems, decreases participation in formal education of young people, along with depleted family income due to loss of work, and poor disease management thus presenting more additional vulnerabilities to families, patients and communities [1]. HIV/AIDS and its related diseases such as pyomyositis are a threat to social and economic development and they can lead to poverty, affecting particularly men, women and young people in their most productive age [1]. Several researchers have proposed that effective prevention and care in enabling environments can only help the HIV/AIDS and other related conditions to overcome the devastating outcomes of

the disease [1]. It is suggested that by an appropriate response to support those affected by HIV/AIDS and other related conditions, everyone gains and no one loses [2]. Families' gain as the income from work will continue, children gain as they continue to receive support from their families and in this way people living with HIV/AIDS (PLWHAs) and pyomyositis remain productive for longer and the state and communities gain because production is not disrupted in key sectors such as education, agriculture, farming and public service duties [2]. Socio-economic status (SES) and effects are often measured as a combination of education, income and occupation and it is commonly conceptualized as the social standing or class of an individual or group [2,3]. Socio-economic status is typically broken into three categories, high SES, middle SES, and low SES to describe the three areas a family or an individual may fall into [2,3]. So when placing a family or individual into one of these categories any or all of the three variables (income, education, and occupation) can be assessed and additionally, low income and little education have shown to be strong predictors of a range of physical and mental health problems, ranging from respiratory viruses, arthritis, coronary disease, and schizophrenia [2,3]. These may be due to environmental conditions in their workplace, or in the case of mental illnesses, may be the entire cause of that person's social predicament to begin with [2,3]. HIV status and other diseases such as pyomyositis often have a negative impact on socio-economic status by constraining an individual's ability to work and earn income [3].

A previous research have indicated that up to 45% of people living with HIV are unemployed [4] and the effects of HIV and pyomyositis on the physical and mental functioning can make maintaining regular employment difficult [4]. Patients with HIV and pyomyositis infection may also find that their work responsibilities compete with their health care needs [4]. Furthermore, individuals infected with HIV are often discriminated against in their workplaces, leading to their termination or forced resignation [5,6]. Children infected with HIV and pyomyositis often exhibit cognitive deficits when compared with their uninfected peers [7]. These deficits have been found to adversely affect learning and earning ability later in life [7].

49 Against this background, the present study was undertaken to assess the socio-economic effects
50 of primary pyomyositis to the patients, family, communities and Hospitals.

51 52 **2. PATIENTS AND METHODS**

53 **2.1 Study setting**

54 This study was conducted in Gulu, Kitgum, Pader and Agago districts of Northern Uganda from
55 September 2011 to November 2013. The centres where this research on pyomyositis patients was
56 conducted were: Gulu Regional Referral Hospital, Lacor Hospital, Kitgum Government Hospital,
57 Kitgum St. Joseph's Hospital and Kalongo Hospital which are situated in the above districts. This
58 region where the study was conducted is just recovering from over 20 years of civil war between
59 the Government of Uganda and Lord's Resistance Army (LRA). The populations of these districts
60 are largely rural; many of whom were displaced into camps infamously known as the internally
61 displaced peoples camps (IDPS) for over 10 to 12 years for safety from insurgency. It is estimated
62 that over two million persons in the region were displaced into IDP camps from 1996 to 2008 where
63 they were being fed nearly exclusively on food provided by the United Nations World Food
64 Programs (UNWFP). Reports from the world food program indicated that they provided only 60% of
65 the required calories of food per person per day for the community during their incarceration in the
66 IDP camps which lasted between 10 to 12 years. The community had no other options of obtaining
67 food since their farmland were inaccessible to them due to the insecurity and ordinances planted
68 on their land during the war. According to the Gulu, Kitgum, Pader and Agago district development
69 plans 2009/2010, the 4 districts have a total population of about 1,200,000 people [8].

70 **2.2 Study Design**

71 We conducted a cross-sectional study design using qualitative research methods: Six Focus Group
72 Discussions (2 with male pyomyositis patients, 2 with female patients and 2 with the next of kin); 4
73 In-depth Interviews with pyomyositis patients who were: A teacher, a Local Council Chairman
74 (LC1), an elderly female and a young female patient; Key Informant Interviews were conducted
75 with health workers who were: Medical superintendents/Hospital Directors, Surgeons, Matrons, In-

76 charge of Surgical ward, theatre nurse, next of kin, supplies officer, and medical officers of the
77 health facility.

78 **2.3 Selection of study participants**

79 We consecutively recruited pyomyositis patients undergoing treatment and rehabilitation at these
80 Hospitals in northern Uganda for Focus Group Discussion while the patients for the in-depth
81 interviews were selected purposively. Key informant interviews were conducted with health workers
82 who were directly involved in the medical and surgical management of pyomyositis patients.
83 Pyomyositis were independently diagnosed by the Principal Investigator and his research team
84 using an approved proforma designed for the recruitment and management of these patients.
85 Those patients that did not consent to the study were excluded.

86 **2.4 Data Collection methods**

87 **2.4.1 Key informant interviews (KIIs):** Eight key informant interviews were conducted with the
88 Health workers of these Hospitals where the researches were conducted: The staffs interviewed
89 included the Medical Superintendents/Hospital Directors, surgeons, matrons, in-charge of surgical
90 ward, theatre nurse, next of kin, supplies officer, and medical officers of the health facility who were
91 mainly involved in the medical and surgical management of these pyomyositis patients. Key
92 informant interviews were guided by the KI guide and these were administered by the Principal
93 Investigator and were assisted by his research assistants. Each key informant interview session
94 lasted between 60 to 90 minutes and was only completed when the issues to be discussed were
95 exhausted.

96 **2.4.2 Focus Group Discussions (FGDs):** Six focus group discussions were conducted with the
97 patients and the attendants; two groups were with the male patients; additional 2 groups with the
98 female patients and the last 2 groups with their next of kin. Each discussion group comprised of 8-
99 10 participants who were selected to be relatively homogenous in terms of age and level of
100 education to facilitate free participation among the members. The FGDs was guided by a focus
101 group discussion guide, and this was moderated by the Principal Investigator. During the
102 discussions, the proceedings were recorded in a note book and summarized in themes which were

103 designed for the recruitment and management of these participants. Because the majority of the
104 patients and next of kin were mainly from Acholi tribe which speaks Luo and so both Luo and
105 English languages were used during the discussion to aid the free discussions among the
106 participants. Each focus group discussion sessions lasted between 60 to 90 minutes on average
107 and observed in a cordial environment until most of the important issues were exhaustively
108 discussed.

109 **2.4.3 In-Depth Interviews (IDIs):** Four in-depth interviews were conducted with 4 patients who
110 were purposively selected because of the special and in-depth information they had about the
111 disease and the massive influence they had on their peers and community. The patients that were
112 selected included: a primary school teacher, a Chairman Local Council one (LC 1), one elderly
113 woman and one young girl.

114 The In-depth interviews were guided using the IDI guide which were developed during the
115 recruitment and management of pyomyositis patients and were administered by the Principal
116 Investigator assisted by his research assistants. Each session of the interview lasted for the
117 duration between 60 to 90 minutes and was completed when all the issues raised were discussions
118 to exhaustion.

119 **2.5 Data Analysis**

120 The Principal Investigator and his research assistants collected the data which were triangulated
121 and transcribed into electronic text and summarized into key themes selected before and during
122 the data collection and analysis process (thematic content analysis).

123 **2.6 Ethical Approval**

124 The study was approved by the Institutional Review Committee (IRC) of Gulu University Medical
125 School GU/IRC/02/01/11 and Uganda National Council of Science and Technology (UNCS&T) HS
126 922. Informed consent and Assent was obtained from each individual patient or next of kin in the
127 presence of their parents/guardians. Confidentiality of information from individual person was
128 protected for all the participants of this research.

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130 3. RESULTS AND DISCUSSION

131 3.1 Socio-economic effects of diseases

132 The economic burden of diseases can be assessed by adding the direct costs of expenditure on
133 prevention and treatment with the indirect costs of productive labour time lost because of morbidity
134 and mortality [9]. Costs can be assessed at the micro-level to provide insight into the effects on
135 individual households and businesses, and at the macro-level, to show the effects on the economic
136 performance of a nation [9]. For instance, the financial and economic costs of treatment and control
137 of neglected tropical diseases are often considered from the perspective of the health-care
138 provider, most notably the costs faced by government-funded health facilities [9]. Individuals and
139 families have heavy out-of-pocket (direct) costs when seeking care for treatment for these diseases
140 [9]. In Ghana for example, the cost of care per patient with Buruli ulcer in a household in the
141 poorest earning quartile was reported as 242% (193-315%) of their annual earnings, which can be
142 regarded as catastrophic [10]. By contrast, in a household in the richest earning quartile the cost
143 per patient was reported as 94% (89-105%) of their annual earnings [10]. This shows that although
144 the economic effect on both income groups is catastrophic, this difference indicates inequity, since
145 treatment costs disproportionately affect the incomes of the lowest-income households [10,11]. A
146 study in Sri Lanka [12] reported how the poorest patients with lymphatic filariasis were driven into
147 the medical poverty trap, and how they delayed accessing the health-care system, thereby allowing
148 the symptoms to progress and making treatment difficult or impossible [12]. Studies in Thailand
149 and South Vietnam found that an average family pays US\$74 and \$67, respectively, to treat a child
150 with dengue haemorrhagic fever, which was more than an average monthly salary at the time when
151 the studies were done [13,14]. The indirect costs to people affected by neglected tropical diseases
152 and their carers, and the economic effect on a household for example, further compounds the costs
153 [15]. It is therefore important to note that measuring morbidity and mortality are key considerations
154 for estimating the burden of disease in populations [16] however, focusing only on morbidity and
155 mortality effects provides an incomplete picture of the adverse impact of ill health on human
156 welfare and in particular, the economic consequences of poor health can be substantial [16].

157 Health 'shocks'—such as unexpected increases in health expenditure reduced functional capacity
158 and lost income or productivity—are often a primary risk factor for impoverishment [17,18]. Poor
159 levels of health may also adversely impact educational attainment and consequent levels of future
160 income [18].

161 At a societal level, poor population health is associated with lower savings rates, lower rates of
162 return on capital, and lower levels of domestic and foreign investment; all of these factors can and
163 do contribute to reductions in economic growth [19]. So, measurement of these various adverse
164 impacts provides decision-makers with an indication of the extent to which a specific disease or,
165 more generally, depleted health status disrupts or reduces economic production or consumption
166 opportunities at the household or societal level [19].

167 It has been observed that in many developing countries the average consumption of non-health
168 related goods and services is close to the subsistence level, so households are often forced to
169 decrease domestic savings, to sell assets or to increase commercial or informal borrowings [19,20].

170 The aggregation of these separate transfers frequently implies that increased health expenditures
171 exert an overall negative impact on savings at the societal level [19,20]. Several studies have
172 assessed this negative impact on savings and have shown that it is likely to be considerable,
173 especially in the case of epidemics such as HIV/AIDS [20,21,22,23]. On the other hand, lower
174 aggregate savings are likely to lead to increases in interest rates and the opportunity cost of
175 investment, which can then impact negatively on the formation of capital and ultimately on
176 economic growth [23].

177 Furthermore, several studies have suggested that improved health conditions exert a direct impact
178 on economic growth by increasing worker productivity [24,25,26,27]. A healthier workforce enjoys
179 greater physical and mental ability and therefore is able to produce more with the same amount of
180 inputs [26,27]. The aggregate impact on economic growth of increased labour productivity can be
181 quite substantial [26,27]. For instance, in an analysis of the economic impact of historical
182 improvements in nutrition in England and Wales, Fogel (1994) showed that around one third of the
183 growth of the British economy over the period 1780-1980 can be attributed to better nutrition and

greater efficiency in transforming nutritional input into economic value [28]. Furthermore, some authors have argued that this effect is especially important in the context of developing countries, since a high proportion of labour force in these countries is engaged in manual work and productivity tended to be more reliant on the sheer physical capacity to work [29,30,31]. In these cases therefore, health improvements that increases the number of healthy workers for a fixed stock of land and capital in the economy might lead to higher unemployment or lower wages [30,31]. Therefore, HIV status and other diseases such as pyomyositis often have several negative socio-economic effects by constraining an individual's ability to work and earn income. In this study, there were varying views among patients, health workers and relatives about the socio-economic effects of pyomyositis on patients, families, communities and health facilities.

On the knowledge of the health workers to the social effects of pyomyositis, a nurse in the surgical ward at Gulu Hospital said,

"Pyomyositis is a very devastating disease to patients because it deprives the family of their bread winners; isolates them; depresses them; they lose their social status in the community and confines them to the hospital beds. Some family members have complained that pyomyositis prevents a spouse from fulfilling their conjugal rights and in some instances it has led to family misunderstanding, extramarital affairs and sometimes divorce".

Similarly, in one of the focus group discussions, a patient with pyomyositis at Gulu Regional Referral Hospital said, *"I have lost so much due to this disease because it deprived me from my routine earnings, isolated me from my family, it made me to become depressed; I lost my social status in my community and it confined me into this hospital bed, and denied me the opportunity to have my conjugal rights and in some instances led my wife to have an extramarital affairs and my wife had threatened to divorce me".*

It has been observed that an important economic consequence of disease or injury at the household level is that, through its impact on functioning, individuals are unable to perform their usual day-to-day activities [29]. Just as being fit and healthy tends to boost productivity (particularly

210 in lower-income countries where employment opportunities tend to depend more on physical
211 strength and endurance; so poor levels of health restrict productivity [29].

212 On the economic effect of the disease on a patient, another patient with pyomyositis at Kitgum
213 Government Hospital said, *"I have lost so much income due to this disease; my business of retail*
214 *trading has collapsed; I am no longer receiving the profits from my business; my suppliers have*
215 *stopped supplying me because the previous bills have not been paid and the shop attendant has*
216 *run away with my money from the previous sales; I am therefore currently spending more than the*
217 *profit I used to earn; and my children have been chased away from schools because of lack of*
218 *school fees".*

219 This observation is not new in that increased health expenditures are also foreseen to impact on
220 government's resources, by reducing the amount of household taxable income and increasing the
221 amount of expenditures that have to be covered out of public funds [32]. The resulting impact on
222 public budgets limits the government ability to spend resources in other areas, particularly in social
223 expenditures such as education and in public investments in infrastructure projects, sanitation,
224 science and technology, and other strategic areas [32]. Public investment is a major source of
225 economic dynamism and economic growth in many developing nations [32]. Consequently,
226 reductions in public investment resulting from increased health expenditures can seriously
227 compromise long-run economic growth potential [32]. On the other hand, tighter overall budgets
228 can compel governments to increase the level of taxation in order to meet increased additional
229 health expenditures [32]. This in turn can have macroeconomic repercussions by depressing
230 aggregate demand and therefore limiting the growth potential of the economy [32].

231 On the issue of the family matters and its linkages, another patient with pyomyositis from St.
232 Joseph's Hospital in Kitgum said, *"Socially, I can no longer perform my duties as Chairman LC I*
233 *because I have been sickly for a very long time and now I am confined to this Hospital bed for*
234 *some time now. I cannot sit on a chair for a long duration and I am always in pain and sometimes*
235 *my body smells bad and this makes me feel out of place when in public gatherings. I can no longer*
236 *attend community functions and most members of my community claim that I can no longer lead*

237 *them because I am always absent. This has reduced my influence in the community activities and*
 238 *made me to become less approachable although I still struggle to attempt to conduct my work*
 239 *normally”.*

240 **3.2 Cost of the disease to the patient and health facility**

241 On the overall cost of the treatment of pyomyositis to the hospital, a theatre nurse of Gulu Regional
 242 Referral Hospital who has been in service for over ten years said, *“The cost of treatment of*
 243 *pyomyositis is very high compared to other surgical diseases because of the surgical equipments*
 244 *which have to be sterilized, sundries and dressing materials which have to be used, expensive*
 245 *antibiotics which have to be used, anaesthetic agents, resuscitation equipments and the long*
 246 *standing duration of illness and hospital stay. It would be good to prevent the development of*
 247 *pyomyositis in this community”* and she added further that, *“we are actually not sure of the exact*
 248 *cost of hospital management of one pyomyositis patient since most of the costs incurred are not*
 249 *recorded but met by the Hospitals such as the electricity and water bills”.* Similarly, in the Focus
 250 *Group Discussions, there were no agreement on the total cost of the disease to the patient and the*
 251 *family and they equally cited the lack of recorded costs to be used for the verification of the total*
 252 *amount of money actually used”.*

253 On the economic effects of the disease on the family and patient, an attendant of one pyomyositis
 254 patient from Kalongo Hospital said, *“This disease depletes resources from our hands through*
 255 *transport to and from the Hospital on a daily basis. We have to pay for food, water and good diet*
 256 *for the patient. This has caused a lot of financial stress to the family and relatives. We keep on*
 257 *borrowing from neighbors, friends and in-laws and we hope when the patient recovers, he will have*
 258 *to work very hard to pay back the debts we have accumulated over the period. We have sold*
 259 *nearly all our food store reserves from the granary and we have moved through several steps in*
 260 *order to achieve healing or some remedies for the illness. We, as a family are now becoming food*
 261 *insecure and no more money for school fees for the children for the next term. We shall therefore*
 262 *need to take a bank loan although the interest rates currently are very high. In summary, the*
 263 *disease is making our family to become poor”.*

264 Since the effects of changes in the demographic composition caused by diseases are intrinsically
265 dynamic, it is however possible that negative impacts in the present can be transformed into
266 positive shocks in the future and vice-versa [33,34]. Bloom and Canning (2000, 2008) described
267 the concept of "demographic dividend" as countries undergo a process of demographic transition
268 from high to low rates of mortality and fertility [35]. Improvements in health and sanitation
269 conditions for example can cause significant declines in rates of child mortality and consequent
270 demographic explosion with exponential rates of population growth [35]. Over time, as parents
271 adapt to the new environment with low child mortality, the fertility rates also tend to decline, with the
272 effect that we will observe a baby boom cohort that is much larger than both the preceding and the
273 following birth cohorts [36]. Bloom and Williamson (1998) examined the significance of this effect in
274 explaining the rates of economic growth in East Asia during the period 1965-1990 [36]. The results
275 suggest that population dynamics account for 1.4-1.9% of annual GDP per capita growth in the
276 region during this period (approximately half of the overall growth observed) [36]. Conversely,
277 Bloom and Malaney (1998) estimated that reduced population size caused by the mortality crisis
278 seen in Russia during the 1990s contributed significantly to reduced economic growth over this
279 period [37]. It is therefore important to examine the overall effects of a disease to the person,
280 family, community and the whole country.

281 **3.3 Costs related to treatment of patients**

282 On the cost incurred by the Hospital in managing patients with pyomyositis, a nurse from Gulu
283 Regional Referral Hospital said, *"I estimate conservatively that we use about five hundred to one
284 million Uganda shillings (approximately \$400) to manage one pyomyositis patient and this excludes
285 the personal cost to the individual patient". She further added that, "the cost varied widely
286 depending on the stages of the disease, co-morbidities, nature and complications that may have
287 already occurred on the patient. Those with larger abscesses and in advanced stages of the
288 disease were more likely to spend longer time in the hospital and therefore larger amounts of
289 money would be used".*

290 On the issue of the economic effect on the running the health facilities, an in-charge in the surgical
 291 ward in Kitgum Government Hospital said, *"pyomyositis patients have increased the bed*
 292 *occupancy rates of our hospital because they spend longer than other surgical patients, they use*
 293 *plenty of water, medical sundries and electricity that have to be paid for by the Hospital. Their*
 294 *management grossly affects the utilization of resources in this health facility; I suggest that it would*
 295 *have been better if the disease was prevented if the cause could be known especially those*
 296 *occurring in this region".*

297 It has been similarly observed that some diseases such as HIV/AIDS affect mainly the working age
 298 population and can exert significant pressure on the demographic structures [38]. High mortality
 299 rates among working age populations can lead to increasing dependency ratios, and lower
 300 population and labour force growth, with quite substantial economic impact in terms of loss of
 301 market output [38]. There are also possible implications for reduced investments in human capital
 302 formation, since the young might be forced to engage earlier in market productive activities and
 303 also in non-market production, for instance acting as informal carers [38].

304 **3.4 Effects of the illness on the job**

305 On the responses of the employers from the work places, one patient who had had a prolonged
 306 absence from work at Kitgum Government Hospital said, *"I have already received a warning letter*
 307 *from my employer because of my prolonged absence from duties. My supervisor thinks I am just*
 308 *lazy to return to work and probably I have chosen stubbornly to remain in this hospital. This*
 309 *unfortunate but unfair report has tainted my records in Public service just because they do not*
 310 *understand this disease. I am unfairly treated; they do not understand the disability I have acquired*
 311 *because of the disease. I suffer lots of pain and the joints and the muscles are weaker and this has*
 312 *created the biggest disability in my life. The employers need to understand this problem and*
 313 *provide both social and financial support to the employees suffering from pyomyositis because it*
 314 *affects me negatively socially, physically and economically".*

315 Weil (2007) identified a number of indirect channels through which health can affect economic
 316 development and increase labour productivity [26]. First, improvements in overall health conditions

317 can contribute to lower absenteeism and worker turnover, and to increase cognitive functioning
318 [26]. In the same way, these factors might have important implications for production costs [26].
319 Absenteeism and increased worker turnover often force firms to hire additional workers, who then
320 need to receive additional training and require time to adapt to their new functions [26]. On the
321 other hand, improvements in cognitive abilities can contribute to improve the quality of education
322 for a given level of schooling, which in turn can be expected to improve labour productivity [26]. In
323 addition, productivity losses and lower working capacity resulting from disease and injury often lead
324 to reduced household earnings. This can have important aggregate implications, even though
325 some countries have counterbalancing mechanisms in place, such as systems of disability
326 insurance, that can help to mitigate the effects for the household. From a macroeconomic
327 perspective, however, the resulting lower economic efficiency implies that the overall level of
328 production for a given amount of inputs is reduced [26]. Lower productivity and income generation
329 can exert knock-on effects on aggregate demand and supply, which can hinder the pace of
330 economic growth. For example, reduced spending power at the household level might discourage
331 firms from investing in productive capacity and contracting workers, further intensifying the
332 reduction in aggregate demand [26]. The second indirect channel of impact of better health on
333 economic growth identified by Weil (2007) is via increased incentives to delay retirement and to
334 save for retirement [26]. Some diseases such as HIV/AIDS affect mostly working age population
335 groups and can contribute to reduce labour market participation and force people into early
336 retirement, reducing the average retirement age. This in turn can have important impacts on the
337 dependency ratio in the economy and, by extension, on potential economic growth [26]. Moreover,
338 the additional numbers of individuals that are forced into early retirement often require special
339 medical care and specialized services. This can contribute to reduce the amount of resources that
340 can be directed into productive activities and can also exert cost pressures on businesses, via
341 increased health care costs and insurance premiums [26]. On the other hand, the expectation of
342 longer retirement periods resulting from mortality improvements often leads to higher savings
343 during active life, which in turn can contribute to increase the stock of physical capital per worker

344 [26]. As discussed above, the third channel through which health improvements affect economic
345 growth is via improved incentives to investing in education due to longer payoff periods in the
346 labour market [26].

347 Changes in the demographic composition of a nation can have significant impacts on economic
348 performance and for instance, changes resulting from mortality variations that increase the
349 dependency ratio can impact on economic growth [26]. Reductions in the size of the working age
350 population due to sexually transmitted pandemic diseases such as HIV/AIDS are a case in point
351 [26].

352 **3.5 The way forward with regards to pyomyositis**

353 On the way forward, an attendant of one of the patients in Kitgum Government Hospital suggested
354 that because pyomyositis was so rampant in the communities where they live, it was advisable that
355 intense mobilization and sensitization of the community should be undertaken to dispel the
356 misconceptions about it and also design an activity that should remedy the socioeconomic effects
357 of the disease. She suggested that the mobilization and sensitization should include the elders,
358 opinion leaders, church leaders and local government officials so as to reach all persons in the
359 community that still suffer quietly with the disease.

360 **4. CONCLUSION**

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362 There is a wide range of socio-economic effects of primary pyomyositis to the population of
363 Northern Uganda and it presented with a number of socio-economic effects similar to those
364 experienced in chronic diseases such as HIV/AIDS.

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369 Consent

370 All authors declare that written informed consent was obtained from the patients, next of kin,
371 families, health workers and communities for publication of this manuscript. A copy of the written

consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

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ETHICAL APPROVAL

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All authors hereby declare that the protocols have been examined and approved by the appropriate

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Ethics Committee and have therefore been performed in accordance with the ethical standards laid

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down in the 1964 Declaration of Helsinki.

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1. Taraphdar P, Rray TG, Haldar D, Chatterjee A, Dasgupta A, Saha B, and Mallik S. Socio-economic consequences of HIV/AIDS in the family system. *Niger Med J*, 2011;52(4):250-253.

386

387

2. ILO project. Assigning the socio economic impact of HIV/AIDS on PLWHAS and their families in India-undertaken. [Last accessed on 2006 Jan 24]. Available from: <http://www.ilo.org>, 2006.

388

389

390

391

3. Nandakumar AK, Schreider P, Butera D, Pitayanom S, Kongslin S, Wattana S. Use and expenditures on outpatient health care by a sample of HIV positive individuals in Rwanda. Paper presented at the International AIDS Economic Network (IAEN) Symposium on the economics of AIDS. Durban, South Africa; 2000. *Population Bulletin*, 2002;57:22.

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4. Rabkin J, McElhiney M, Ferrando SJ, Van Gorp W & Lin SH. Predictors of employment of men with HIV/AIDS: A longitudinal study. *Psychosomatic Medicine*, 2004;66:72-78.

5. Dray-Spira R, Lert F, Marimoutou C, Bouhnik AD, & Obadia Y. Socio-economic conditions, health status and employment among persons living with HIV/AIDS in France in 2001. *AIDS Care*, 2003;15(6):739-748.

6. Kass NE, Munoz A, Chen B, Zucconi SL, Bing EG & Hennessy M. Changes in employment, insurance, and income in relation to HIV status and disease progression. *J Acquired Immune Defic Syndr*, 1994;7:86-91.

7. Martin SC, Wolters PL, Toledo-Tamula MA, Zeichner SL, Hazra R, & Civitello L. Cognitive functioning in school-aged children with vertically acquired HIV infection being treated with Highly Active Antiretroviral Therapy (HAART). *Developmental Neuropsychology*, 2006;30:633-657.

8. Uganda Bureau of Statistics (UBOS) and ORC Macro. *Uganda Demographic and Health Survey 2010-2011*. Calverton, Maryland, USA: UBOS and ORC Macro, 2011.

9. Lesong C, Thomas E, David HM. Socio-economic aspects of Neglected tropical diseases. *Lancet*, 2010;375(9710):239-247. Doi:10.1016/S0140-6736(09)61422-7.

10. Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJL. Household catastrophic health expenditure: a multicountry analysis. *Lancet*, 2003; 362:111-117.

11. Maumma GA, Whitney EAS, Dadzie F. Buruli ulcer, poverty, and poverty reduction in rural Ghana, 2003. Annual Meeting of the WHO Global Buruli Ulcer Initiative. 2006; Geneva, Switzerland.

412

- 413 12. Whitehead M, Dahlgren G, Evans T. Equity and health sector reforms: can low-income
414 countries escape the medical poverty trap? *Lancet*, 2001;358:833-836.
- 415 13. Clark DV, Mmammen P, Mammen J, Nisalak A, Puthimethee V, Endy TP. Economic impact of
416 dengue fever/dengue hemorrhagic fever in Thailand at the family and population levels. *Am J*
417 *Trop Med Hyg*, 2005;72:786-791.
- 418 14. Harving ML, Ronsholt FF. The economic impact of Dengue hemorrhagic fever on family level in
419 southern Vietnam. *Danish Med Bull*, 2007;54:170-172.
- 420 15. Grietens KP, Boock AU, Peeters H, Hausmann-Muela S, Toomer E, Ribera JM. It is me who
421 endures but my family that suffers: social isolation as a consequence of the household cost
422 burden of Buruli ulcer free of charge hospital treatment. *PLoS Negl Trop Dis*, 2008;2:e321.
- 423 16. WHO. Who Guide to identifying the economic consequence of Disease and Injury. WHO
424 Cataloguing-in-publication data, 2009, WHO, 20 Avenue Appia, 1211 Geneva, 27, Switzerland.
- 425 17. WHO. The World Health Report, 1999: Making a difference. Geneva, Switzerland: World
426 Health Organization, 1999.
- 427 18. Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJ. Household catastrophic
428 health expenditure: a multi-country analysis. *Lancet*, 2003;362:111-7.
- 429 19. Ruger J, Jamison D, Bloom D, Canning D. Health and the Economy. In: MH Merson, RE Black,
430 AJ Mills (Eds) *International Public Health: Diseases, Programs, Systems and Policies*.
431 Sudbury, MA, USA: Jones and Bartlett Publishers, 2006.
- 432 20. Cuddington J. Modeling the macroeconomic effects of AIDS, with an application to Tanzania.
433 *The World Bank Economic Review*, 1993;7:173-189.
- 434 21. Cuddington J and Hancock J. Assessing the impact of AIDS on the growth path of the
435 Malawian economy. *J Development Economics*, 1994;43:363-368.
- 436 22. Arndt C and Lewis J. The macro implications of HIV/AIDS in South Africa: A preliminary
437 assessment. *South Afr J Economics*, 2000;68:380-392.
- 438 23. Haacker. The economic consequences of HIV/AIDS in Southern Africa. *IMF Working Paper*
439 *No. 02/38*, 2002.
- 440 24. Bloom D, Canning D and Sevilla J. The effect of health on economic growth: A production
441 function approach. *World Development*, 2004;32:1-13.
- 442 25. Alsan M, Bloom D and Canning D. The effect of population health on foreign direct investment
443 inflows to low- and middle-income countries. *World Development*, 2006;34:613-630.
- 444 26. Weil D. Accounting for the effect of health on economic growth. *Quarterly J Economics*, 2007;
445 122:1265-1306.
- 446 27. Bloom D and Canning D. Population health and economic growth. *Background paper for the*
447 *Commission on Growth and Development*. Washington, DC, USA: World Bank, 2008.
- 448 28. Fogel R. Economic growth, population theory, and physiology: The bearing of long-term
449 processes on the making of economic policy. *American Economic Review*, 1994;84:369-395.
- 450 29. Strauss J and Thomas D. Health, Nutrition, and Economic Development. *J Economic*
451 *Literature*, 1998;36:766-817.
- 452 30. Bhargava A, Jamison D, Lau L, Murray C. Modeling the effects of health on economic growth.
453 *J Health Economics*, 2001;20:423-440.
- 454 31. Bloom D, Canning D and Graham B. Longevity and Life-cycle Savings. *Scandinavian J*
455 *Economics*, 2003;105:319-338.

- 456 32. Agénor P and Moreno-Dodson B. Public infrastructure and growth: New channels and policy
457 implications. *World Bank Policy Research Working Paper 4064*;2006.
- 458 33. Bloom D and Canning D. The health and wealth of nations. *Science*,2000;287(5456):1207-
459 1209.
- 460 34. Bloom D and Canning D. Population health and economic growth. *Background paper for the*
461 *Commission on Growth and Development*. Washington, DC, USA: World Bank, 2008.
- 462 35. Lee R (2003). The demographic transition: Three centuries of fundamental change.
463 *J Economic Perspectives*, 2003;17:167-190.
- 464 36. Bloom D and Malaney P. Macroeconomic consequences of the Russian mortality crisis. *World*
465 *Development*, 1998;26:2073-2085.
- 466 37. Bloom D and Williamson J. Demographic transitions and economic miracles in emerging Asia.
467 *World Bank Economic Review*, 1998; 12:419–455.
- 468 38. Greener R. AIDS and the macroeconomic impact. In: *State of the art: AIDS and economics*,
469 edited by Steven Forsythe. Washington, DC, USA: Futures Group International, 2002.
- 470
- 471
- 472
- 473