

**The role of Participatory Learning and Action on strengthening the different domains of empowerment on self-medication with antimicrobials in Nyalenda Informal Settlement, Kisumu County, Kenya**

**Abstract**

Self-medication with antimicrobials (SMWA) is a common global practice. Studies in Nyalenda B Ward, an informal settlement in western Kenya, found significant households (76.6%) perceived the practice of SMWA as convenient and appropriate. The rationale of the current study was in response to unsolved self-mediation practice through Functional Health literacy in such set-ups. This study used Participatory Learning and Action (PLA) as a tool and assessed its role on strengthening the different domains of empowerment on SMWA. Data was collected from 1531 PLA trainees through focused group discussions and structured questionnaires. Results revealed that reasons for SMWA are ignorance and easier accessibility. Logistic regression analyses to establish the association between PLA domains and all empowerment domains, revealed that flexible learning and listening increase power within by 5 times (OR=5.361, 95%CI=3.101-9.268,  $P<0.0001$ ), power with by 6 times (OR=6.160, 95%CI=3.437-11.39,  $P<0.00010$ ) and power over by 2 times (OR=2.261, 95%CI=1.293-3.954,  $P<0.0001$ ). Participatory evaluation may increase power within by almost 8 times (OR=7.711, 95%CI=5.184-11.459,  $P<0.0001$ ), power with by 5 times (OR=5.012, 95%CI=3.375-7.443,  $P<0.0001$ ), and power over by more than 3 times (OR=3.618, 95%CI=2,375-5,509,  $P<0.0001$ ). Participatory interaction may increase power within by almost 8 times (OR=7.823, 95%CI=4.798-12.763,  $P<0.0001$ ), power with by over 8 times (OR=8.610, 95%CI=4.987-14.866,  $P<0.0001$ ), power over by 4 times (OR=4.003, 95%CI=2.325-6.693,  $P<0.0001$ ). Therefore, PLA on SMWA may increase the community empowerment with knowledge and skills of SMWA with a magnitude of 8 but the ability to negotiate their inclusion in the health system may increase with a comparative lower strength of 2 times.

**Keywords:** Self-medication with antimicrobials; participatory learning and action; community empowerment.

**INTRODUCTION**

32 Self-medication is the obtaining and consumption of a drug without the advice of physician  
33 either for diagnosis, prescription or surveillance of treatment (Montastruc, Bagheri, Geraud, &  
34 Lapeyre-Mestre, 1997) or the use of medication by a patient on his own initiative or on the  
35 advice of a pharmacist or a lay person instead of consulting a medical practitioner (WHO, 2000).  
36 The practice can readily relieve acute medical problems, save time spent in waiting to see a  
37 doctor, save life in a cute condition and may contribute to decreased healthcare cost (Hughes,  
38 McElnay, & Fleming, 2001), however, it may result in wasting of resources, increase in  
39 pathogens resistance, drug interactions, adverse drug reactions, prolonged suffering and drug  
40 dependence. The practice has the potential of harming society at large as well as the individual  
41 patient (WHO, 2001).

42  
43 The prevalence of self-medication with antibiotic ranges from 48% in Saudi Arabia to 78% in  
44 Yemen and Uzbekistan (Belkina Tatyana, 2014), in Sudan, Khartoum State 73.9% (Awad,  
45 Eltayeb, Matowe, & Thalib, 2005), in Kenya within Nyalenda B Sub Location is at 76.9% of the  
46 households (Owour, 2015) while in Ethiopia it is low (14.5%). Laws and policies are in place to  
47 manage antibiotics, but the Kenya government regulation is neither effective nor enforced. The  
48 positive attributes of self-medication are shared among the patients, healthcare professionals, the  
49 healthcare system and the pharmaceutical industry but the patient and the community meets the  
50 risk because they have inadequate or lack of knowledge and understanding of the risks associated  
51 with self-medication. It has been established that the communities that are neither empowered  
52 with knowledge and skills of self-medication with antimicrobials nor ability to negotiate their  
53 inclusion in the health system are prone to SMWA (Nasir, 2012; Ocan et al., 2014; Okeke et al.,  
54 2005) expanding access to such social entitlements will facilitate the reduction of the level of  
55 self-medication with antimicrobials and promote perceptions with an experiential value therefore  
56 enhancing rationale use of antimicrobials and minimizing risk.

57 The rationale of the current study was developed in response to unsolved issues in self-  
58 medication with antimicrobials, especially in informal settlements. The conventional approaches  
59 to controlling self-medication with antimicrobials are less effective and have not yielded the  
60 desired result in the affected regions. The study realizes the importance of identifying where the  
61 problem lies by accessing the tacit knowledge, which varies across people, communities and  
62 areas and it is often specific to locality, age, gender and class. Such knowledge is contextual and

63 includes answers to many questions, augments problem solving abilities of both local  
64 communities and the researcher and helps in probing relational linkages between issues and  
65 causal forces from different dimensions. The study also recognizes the fact that there are  
66 multiple perspectives of primary stakeholders of self-medication with antimicrobials.  
67 Appreciating such multiple perspectives is crucial in determining the priorities and preferences  
68 of the primary stakeholders. This study therefore embraced the issue of human development and  
69 community involvement or ownership for the purpose of sustaining this intervention. Given the  
70 need to control self-medication with antibiotics ‘from the ground up’, the perspectives of the  
71 community, must become a normative part of self-medication research. The PLA is a powerful,  
72 practical ‘fit-for-purpose’ methodology for achieving this since it enables groups to engage  
73 meaningfully and contribute with ease to academic research.

74

75 A community mobilization using empowerment model as a strategy can be implemented through  
76 Participatory Learning and Action (PLA) as a tool. (Kabeer, 2003) refers to empowerment as the  
77 processes by which those who have been denied the ability to make choice acquire such ability.  
78 There must have been the ability to have chosen differently and if the alternative does exist for  
79 you. The concept of empowerment exists in three dimensions: The resource dimension which  
80 includes, economic, human, social, political and cultural resources that serves to enhance the  
81 ability to exercise choice. The agency dimension which is the ability to define one's goals and act  
82 upon them. The achievement dimension that refers to the extent to which this potential is  
83 achieved or fails to be achieved in relationship to the outcomes of people’s efforts.

84

85 Insights from gender theory into the empowerment debate have increased clarity over the  
86 concept and operation of power, most notably that power is about more than just ‘power over’  
87 people and resources. Previous literature (Rowlands, 1997) categorizes four types of power  
88 relations to stress the difference between power over (ability to influence and coerce) and power  
89 to (organize and change existing hierarchies), power with (power from collective action) and  
90 power within (power from individual consciousness). At present, much of the focus of both  
91 community participation and empowerment is placed on participatory approaches. Participatory  
92 Learning and Action is another variation of Participatory Action Research that began in rural  
93 development research. The theory and practice of PLA (Chambers, 1997), recognizes the ability

94 of the non or poorly educated people to make and carry out rational and successful decisions and  
95 actions that were formerly the responsibility of experts, allows innovation to be spread by peer  
96 groups not only by professionals and brings about a role reversal where local people become  
97 colleagues of professionals, thereby generating a change in attitudes and behaviors of the  
98 professionals. Using visualizations, PLA has been used in a wide range of situations for  
99 supporting empowerment goals, through role plays and draw and write techniques as the basis  
100 for generating information (Susan, 2001). It is an approach for learning and organizing local  
101 communities and groups for interacting with them, understanding them and learning from them.  
102 It helps in initiating a participatory process, in sustaining it and in opening up vistas of avenues  
103 for participation. It enables the local people to express, enhance, share and analyze their  
104 knowledge of life and condition and to plan and act. It is a means of understanding and  
105 facilitating and evoking their participation and also opening ways to which such groups can  
106 participate in decision making, project design, planning, execution and monitoring (Melzack,  
107 1973; Mukherjee, 2001).

108  
109 It is upon this background that we conducted a study to establish the role of Participatory  
110 Learning and Action (PLA) on strengthening the different domains of empowerment on self-  
111 medication with antimicrobials in Nyalenda informal settlement, within Kisumu County, Kenya.

112  
113

114 **MATERIALS AND METHODS**

115 *Study area.* The study was carried out in Nyalenda B Ward, a sub-location in Nyalenda informal  
116 settlement within western Kenya. Nyalenda is the second largest informal settlement in Kisumu,  
117 after Manyatta, and is situated to the south of the Kisumu city. Nyalenda is on latitude -.1267 and  
118 longitude 34.7575. The area is bound by Ring Road to the North and marshlands to the South  
119 and consists of two separate settlements or Sub-Locations, Nyalenda A and B. Nyalenda B  
120 features five smaller units (Kilo, Got Owak, Dunga, Nanga and Western), that occupy an area of  
121 4.7 km<sup>2</sup>.Nyalenda B Sub-Location has a population of approximately of 32,430, out of which  
122 16,189 are males and 16,241 are females distributed in a total of 8,561 households (KIHBS,  
123 2005/06).

124  
125 *Study design and population.* The study adopted a descriptive survey design and the data was  
126 collected through structured questionnaire and focused group discussions (FGDs). The study  
127 purposively picked 30 CHVs that were trained on PLA on self-medication with antimicrobials  
128 (SMWA) as peer trainers. The PLA workshop on SMWA was conducted followed by 150 PLA  
129 open learning sessions for 1501 households. This was facilitated by the trained CHVs. The  
130 households open learning sessions was conducted within 2 weeks concurrently. Each trained  
131 CHV facilitated 5 open learning sessions composed of 10 households and administered a  
132 questionnaire for each individual at the end of each session. Prior to the conduct of The Team's  
133 PLA workshop, a planning meeting was held by the researcher, the Community Health  
134 Extension Officer (CHEW), County community focal person, Sub-County community focal  
135 person and selected community representatives to prepare the actual conduct of the discussions.  
136 Members discussed and agreed on the date and the mode of CHVs invitation. Discussions for  
137 this study was held in collaboration with the Nyalenda Health Centre.

138  
139 **CHVs PLA workshop**

140 On the day of the CHV PLA workshop, team introductions and community representation were  
141 done. Explanations of PLA technique and its principles were provided. Self-medication with  
142 antimicrobials problem statement was explained. Illiterate participants were to ask their group  
143 members to help write down their ideas. The CHV PLA workshop randomly formed 6 break-out  
144 groups. Participants were asked to first take part in their group with interest. Each group

145 nominated a group facilitator together with a note-taker. Groups ran concurrently and each group  
146 discussion session lasted about 2 hours. Groups recorded notes on cards and flipcharts and  
147 presented at the end of the session. During feedback, an opportunity was given to the participants  
148 to further elaborate any of their ideas, or clarify any idea they felt had not been captured in  
149 perspective. Data synthesis following CHV PLA workshop was done on the second day. Note-  
150 takers first presented the outcome of their group discussions followed by brief feedback or  
151 further input from the wider group. Finally, after all group presentations and feedback,  
152 participants were asked to evaluate whether their expectations had been met. From group work,  
153 issues identified by participants as major root causes of SMWA, their proposed actions towards  
154 its elimination, the process towards achievement of the desired actions as well as the  
155 responsibility of stakeholders were presented.

156  
157 Each group ranked the most important root causes of self-medication with antimicrobials by  
158 rearranging the causes in order of "changeability", from most changeable to least changeable and  
159 identification of potential strategies for addressing root causes of SMWA. The team then formed  
160 one major group and used index cards for direct ranking. Index cards bearing similar  
161 concerns/ideas were grouped together and tallied. This was followed by data interpretation.

162  
163 **PLA meetings at the household level**

164 This was conducted summarily because of the household representatives' impatience. Every  
165 group of 10 household representatives was taken through SMWA problem statement and  
166 problem analysis using the problem tree, identification of root causes, identification of most  
167 important root causes and identification of possible solutions to the problem. Objective analysis,  
168 identification of root causes that are both important and changeable and ranking potential  
169 strategies to address root causes (important and changeable) of self-medication was not done at  
170 the household level because of limited time. On a later date, the trained CHVs and the researcher  
171 had an open discussion and ranked the households most important root causes of SMWA, the  
172 potential strategies for addressing them, and identification of barriers to the progress of SMWA  
173 control.

174

175 To mitigate for the barriers or to implement structural intervention, the study gave a feedback  
176 report to the local community health facility management on their findings.

177 The researcher, the CHEW for the Nyalenda B CHVs and the health management representatives  
178 then organized for a conflict management meeting. The CHVs encouraged themselves to  
179 continue with the household health promotion and especially community mobilization on self-  
180 medication with antimicrobials with a general aim to conduct an Integrated Health Outreach  
181 services.

### 182 **Data collection procedures**

183 During PLA, data was collected by the nominated note-takers for every group. Groups recorded  
184 notes on cards and flipcharts and presented at the end of the session. Structured questionnaires  
185 for the assessment of PLA and empowerment was then administered to all the trainees at the end  
186 of PLA. The CHVs received training on data collection, key components of the study, including  
187 the objective, detailed content of the questionnaire, and its administration in a way that protected  
188 the identity and privacy of the respondents. The questionnaire was pre-tested in a sub-section of  
189 the CHVs (whose data was not included in the final analyses) and necessary corrections were  
190 made on questions that were not clear. The questionnaire contained closed-ended questions on  
191 socio-demographic characteristics of the trainees and questions in a Likert scale of 4 for  
192 evaluation of all domains of PLA and Empowerment. This study developed a Participatory  
193 Learning and Action and Empowerment Evaluation (PLAEE) tool (See Supplementary Data File  
194 I) that had the type of questions used for measuring the level of all the PLA and empowerment  
195 domains and the measurement procedure. This tool was developed by adopting relevant ideas  
196 from Growth and Empowerment Measure (GEM) survey (Haswell, 2010), the Trocaire  
197 awareness index tool (Trocaire, 2012), a Community Ownership and Preparedness Index (COPI)  
198 tool (Thomas, 2011), and a summative evaluation type tool (Tyler, 1974). Studies that measured  
199 the level of PLA and empowerment (Vassall et al., 2014) and those based on participants  
200 perceptions and valuation using *etic* and *emic* criteria and analysis (O'Reilly-de Brún, 2016)  
201 were reviewed. Finally, theoretical literature on PLA and empowerment was reviewed. The  
202 Growth and Empowerment Measure (GEM) survey tool comprised of a 14-item Empowerment  
203 Scale. The GEM was developed as a tool to measure the process and outcomes of empowerment  
204 interventions such as Family Wellbeing (FWB). The GEM gave some of the measurable  
205 characteristic of empowerment like self-capacity, inner peace, strength, happiness and

206 connectedness. This was assessed using questions in a Likert scale. The Trocaire awareness  
207 index tool was used for assessing the effectiveness of empowerment by asking questions on  
208 awareness of rights, knowledge and duties. A Community Ownership and Preparedness Index  
209 (COPI) tool and a Behavioral Tracking Survey (BTS) were carried out to assess the levels of  
210 preparedness of the CBOs and their members and to determine the strength of community  
211 mobilization. BTS used an interview tool with coded questions on behaviors and perceptions  
212 concerning participation in group activities, beliefs about collective action, safe sex practices and  
213 STI treatment seeking. A summative evaluation type assessed the worth of the workshop  
214 activities (Tyler, 1974). The reliability analysis was done for the tool and the Cronbach's Alpha  
215 of 0.894 was recorded. PLA and empowerment theoretical literature identified PLA domains as  
216 flexible learning and listening, participatory evaluation, participatory interaction and  
217 empowerment domains as power within (Increased awareness and desire to change), power with  
218 (Increased solidarity to challenge underlying assumptions), and power over (changes in  
219 underlying resources and power to challenge constraints).  
220 The PLAEE (See Supplementary Data File I) tool contained questions for PLA (for each  
221 domain) and empowerment (for each domain) assessment in a Likert scale of 4 and they were  
222 coded as 1= Very good, 2=Good, 3=Somehow, and 4=No. Each variable (domain) was assessed  
223 using 3 or more questions.

## 224 **Statistical Analysis**

225 All statistical analyses were carried out using the Statistical Package for Social Sciences (SPSS,  
226 version 24) software. The coded and cleaned data were used to calculate frequencies and  
227 proportions of the socio-demographic characteristics of the 1531 PLA trainees and responses on  
228 PLA and empowerment questions. The mean of all the questions for every domain of PLA and  
229 empowerment was calculated and their corresponding frequencies established to determine the  
230 value coded to a domain for all the 1531 PLA trainees.

231 To establish the level of each domain of empowerment and PLA and to know whether there is  
232 PLA and empowerment achieved or not for every trainee, a Likert scale code was recorded.  
233 'Very good' and 'good' was equated to *Yes* taking up the mean value of 1 through 2.  
234 'Somehow' and 'No' was equated to *No* taking up the mean values of 2.01 through 4. Then the  
235 percentage frequencies of *Yes* and *No* was calculated for all the domains of empowerment and



236 PLA. *Yes* is empowerment and PLA and *No* is no empowerment achieved and PLA not  
237 effectively conducted. The 1531 trainees existed as 30 groups of 50 households except for 1  
238 group that had 51 households and 1 group of 30 CHVs. Chi-square analysis was used to  
239 establish the groups for every category of socio demographic characteristics that was highly  
240 empowered through PLA and to verify association between PLA domains and empowerment  
241 variables. Odd Ratio, 95% CI and p-values for each PLA domain were obtained using binary  
242 logistic regression for each empowerment. For all analyses,  $P \leq 0.05$  was considered statistically  
243 significant.

## 244 **RESULTS**

### 245 **The socio-demographic characteristics of the CHVs and all the 1531 PLA trainees (trained** 246 **CHVs inclusive)**

247 A total of 1531 Nyalenda B community members were purposively chosen and went through  
248 PLA (CHVs inclusive) on SMWA, responded to the questions on empowerment and PLA  
249 assessment. Table 1 presents the socio-demographic characteristics of the study participants.

250 Based on the data the community members aged between 26-35 years developed power with  
251 more significantly relative to the rest of the age categories (48.3%;  $P=0.008$ ), the females  
252 developed power within more significantly as compared to the males (79.0%;  $P<0.0001$ ) and the  
253 mother, in comparison to other family members, developed all categories of empowerment  
254 significantly (power within 68.9%;  $P=0.002$ , power with 68.2%;  $P<0.0001$ , power over 70.3%;  
255  $P<0.0001$ ). Furthermore the community members with secondary level of education were more  
256 significantly empowered in all categories in comparison to other levels of education (power  
257 within 35.0%;  $P=0.025$ , power with 34.2%;  $P<0.0001$ , power over 34.2%;  $P<0.0001$ ) and the  
258 self-employed developed power with more significantly than others in their respective categories  
259 (52.5%;  $P=0.002$ ). Likewise those that had an average income of less than Ksh 5000 developed  
260 power with significantly (70.0%;  $P=0.02$ ) and those that spent less than Ksh500 on purchasing  
261 drugs developed power with and power over significantly (power within 64.7%;  $P=0.008$ , power  
262 over 64.3%;  $P=0.025$ ) in comparison to the relevant categories. Finally the Christian protestant  
263 significantly developed power over (43.9%;  $P<0.0001$ ) and caretakers of children below 12 years  
264 developed all categories of empowerment with a significance (power within 37.7%;  $P=0.018$ ,

265 power with 38.5%;  $P < 0.0001$ , power over 39.2%;  $P = 0.007$ ) as compared to other relevant  
266 categories.

### 267 **PLA conduct**

268 The trainer highlighted self-medication with antimicrobial problem statement and allowed the  
269 team to discuss it freely. All the 100% members were not aware that buying medicine from a  
270 pharmacy without a prescription is self-medication 76.7% assumed headache is malaria, 80%  
271 indicated that any pain in the chest after a cold period is pneumonia, 83.3% agreed that after  
272 taking antimalarials and the headache persist then typhoid should be managed, 53.3% agreed that  
273 *Mara Moja* or *Sona Moja* treats malaria and 60% said amoxicillin and cotrimoxazole were good  
274 for management of common cold. 100% of the members had used self-medication for themselves  
275 or their family members in the last 3 months. The team was then trained on the effect of SMWA  
276 to the individual and to the community by highlighting the nature and the effect of  
277 antimicrobials' prolonged use, over dosages, under dosages, reuse, misuse, and missed diagnosis.

278  
279 The team was given opportunity to ask questions and to add their views. One of the team  
280 members said, "*It is advertised through the radio that we use Mara Moja for severe headache*  
281 *and it controls my headache and when the headache keeps on recurring then I consult with the*  
282 *pharmacy. Another member interjects, "Normally that is just malaria and in my case I just buy*  
283 *AL"* and yet another one said, "*and when it continues then it is typhoid"*. Another member said,  
284 "*Amoxyl works best for me when I get a common cold"*. There were similar statements from  
285 some members. Such statements were freely discussed and a consensus obtained.

286 The team was then split into 6 FGD groups and each group identified the chain of events that  
287 leads to self-medication with antimicrobials, most important root causes, and solutions to  
288 SMWA. Direct ranking of the most important root causes (they were encouraged to have  
289 "changeability" in mind, from most changeable to least changeable) and potential strategies  
290 addressing the root causes of SMWA was done. It was established through FGD that reasons for  
291 SMWA are ignorance, high cost of prescription medicine, unavailability of time, distance from  
292 preferred the health facilities, wrong information or advice, accessibility to self-medication, fear  
293 of HIV status exposure at the facility. The solutions to these problems as enumerated included  
294 community mobilization on SMWA, improvement of the management of the local health

295 facilities and the attitude of the health personnel towards efficient and effective service and  
296 strengthening of the community health strategy.

297

### 298 **Structural modification**

299 The study established that the main barrier to the community mobilization on SMWA was the  
300 community perception of their local health facility services which was poor services. They  
301 highlighted the poor attitude of the health personnel towards efficient and effective service,  
302 inadequate examination equipment, limited types of drugs for treatment of malaria and other  
303 infections and they hoped for 24 hour system of operation. They also hoped that HIV screening  
304 be made voluntary, counseling services be put in place and that health education services be  
305 provided at the facility. This called for mitigating for the barriers or structural intervention. A  
306 feedback report was given to the local health facility management representatives. The  
307 management representatives did not take up these comments positively and blamed the CHVs for  
308 misinforming the public. This called for redirecting efforts to activities that may be more  
309 effective. A conflict management meeting was then organized by the researcher, the CHEW for  
310 the Nyalenda B CHVs and the health management representatives. The CHVs encouraged  
311 themselves to continue with the household health promotion and especially community  
312 mobilization on self-medication with antimicrobials. A 5-monthly Integrated Health Outreach  
313 Services (IHOS) within Nyalenda B was planned for and implemented to fill in the gap for the  
314 community perception of poor health service at their local facility and to mitigate for time factor  
315 and distance. The IHOS reached a total of 575 people of which 154 were children below 5 years.

316

### 317 **Training outcome for CHVs and all the 1531 PLA trainees**

318 The percentage frequency of 'YES' in the CHV group for participatory interaction is 96.4%,  
319 Participatory evaluation is 92.4%, Flexible learning and listening is at 95.3%, power within is  
320 83.5%, power with is 71.8%, power over is at 55.6% hence the level of PLA and Empowerment  
321 achieved for every domain. The percentage frequency of 'YES' in the 1531 PLA trained group  
322 for participatory interaction is 100%, Participatory evaluation is 96% Flexible learning and  
323 listening is 96%, power within is 96%, power with is 94%, power over is 88% hence the level of  
324 PLA and Empowerment achieved for every domain. The percentage frequency for power over is  
325 comparatively low. The percentage frequency of power over components reveals that, even after

326 the PLA training, 20.4% of the trainees did not develop the ability to influence and coerce the  
327 health facility to serve them efficiently, 34.6% were not aware that they were represented at the  
328 Health Facility Management Board, 51.4% did not understand how community health strategy  
329 operates, 23.9% did not know how to access their health rights, opportunities and services but  
330 85.3% were positive that they can access their health rights, opportunity and services through  
331 the health facility. Therefore, to realize better power over results the community health strategy  
332 should be strengthened.

### 333 **The association between PLA domains and all empowerment domains for all the 1531 PLA** 334 **trainees**

335 In order to establish the association between PLA domains and all empowerment domains, the  
336 Odd Ratios, 95% CI and p-values were obtained using binary logistic regression. The results  
337 shows that flexible learning and listening may increase power within by 5 times (OR=5.361,  
338 95% CI=3.101-9.268  $P<0.0001$ ), power with by 6 times (OR=6.160, 95% CI=3.437-11.039,  
339  $P<0.0001$ ) and power over by 2 times (OR=2.261, 95% CI=1.293-3.954.  $P<0.0001$ ),  
340 Participatory evaluation may increase power within by almost 8 times (OR=7.711, 95%  
341 CI=5.184-11.459,  $P<0.0001$ ), power with by 5 times (OR=5.012, 95% CI=3.375-7.443,  
342  $P<0.0001$ ), power over by more than 3 and a half times (OR=3.618, 95% CI=2,375-5,509,  
343  $P<0.0001$ ), Participatory interaction may increase power within by almost 8 times (OR=7.823,  
344 95% CI=4.798-12.763,  $P<0.0001$ ), power with by 8 and a half times (OR=8.610, 95% CI=  
345 4.987-14.866  $P<0.0001$ ), power over by 4 times (OR=4.003, 95% CI=2.325-6.693,  $P<0.0001$ ).  
346 (Table 2).

347 The strength of association between all the PLA domains and power over is relatively lower as  
348 compared to other domains of empowerment

349

## 350 **DISCUSSION**

351 In this study, our use of a PLA approach and methodology enabled community health volunteers  
352 and the household representatives to engage meaningfully and contribute to the identification of  
353 self-medication with antimicrobials' root causes and control measures. In the process, they were  
354 also empowered with the tools for exercising personal control over their health habits (Bandura,  
355 1994). The PLA, if well-facilitated can have an integrating function that prompts broader social

356 connections and enables empowerment. A pilot study in Kisumu a city in Kenya explored the  
357 utility and effectiveness of participatory action research as an approach for youth-led peace  
358 building in marginalized communities and proved it a valuable methodological approach. It  
359 enabled quick learning of skills, direct uptake of systematic challenges and use of minimum  
360 resources on implementation (Amambia et al., 2018). PLA initiatives based on strengthening self  
361 reliance and sustainability and undertaken in the Little Karoo, South Africa and Odibo, Namibia,  
362 as well as in various communities in Zambia, and on numerous RDP capacity-building training  
363 initiatives in the Northern Cape Province. South Africa proved to be appropriate strategy for  
364 development(Wetmore & Theron, 1998). Three key elements that distinguished our approach  
365 from the conventional health education is, flexible learning and listening, participatory  
366 evaluation, and participatory interaction.

367 Our key finding regarding access to the community is that expanding the research team to  
368 include and train CHVs in PLA made it possible to involve the households in a meaningful  
369 participation and to generate a wider sample. The CHVs and the households relate well,  
370 understand and respect each other, thus further pointing out that peer researchers are an essential  
371 bridge for better results. The trained community peer life circumstances and characteristics  
372 closely resembled those of the target population thereby giving them a higher opportunity of  
373 influencing acceptance of health messages (Janz et al., 1996). The findings of the current study  
374 are consistent with those of another one in which a cluster-randomized controlled trial in Nepal  
375 showed an effect of a participatory intervention with women's groups on birth outcomes (Dama,  
376 2004) The intervention in that study worked very well with peer researchers leading to  
377 improved birth outcomes through a low cost, potentially sustainable and scalable, participatory  
378 intervention. A systematic review of 24 studies that was aimed at examining the magnitude of  
379 the impact of community engagement (CE) on health and health inequalities among  
380 disadvantaged populations showed that one of the factors that facilitated CE was PLA and one of  
381 the elements of the programme success was the incorporation of the cultural competent CHWs in  
382 the research protocol. These studies were distributed into different areas of which 17 were  
383 conducted in the United States, and there was one each in Canada, Bangladesh, Africa, China,  
384 the United Kingdom, Iran, and India (Cyril, J.Smith, Possamai-Inesedy, & Renzaho, 2015)

385

386 Our key finding regarding self-medication empowerment is that a PLA methodology enabled  
387 increment of all domains of empowerment on the part of CHVs and the community throughout  
388 the process of the research activities. All domains of PLA were achieved at very high level and  
389 this is also true for empowerment except for power-over which was achieved but at  
390 comparatively lower level. The association between PLA domains and all empowerment  
391 domains is very strong but the strength of association between all the PLA domains and power  
392 over is relatively lower as compared to other domains of empowerment. A study on the Impact  
393 of Participatory Learning and Action Women's Groups Alone or Combined with Cash and Food  
394 Transfers on Maternal Agency in Rural Nepal (Lu Gram, 2018) ruled out larger impacts for PLA  
395 alone, comparable in size to the impact observed in the PLA and cash arm on improvement of  
396 maternal agency (power-over). It has also been recognized that community mobilization  
397 strategies must be complemented by structural interventions to bring about comprehensive  
398 changes in the social, economic, legal and political structures that led to disempowerment in the  
399 first place (Asthana & Oostvogels, 1996; Kerrigan, 2003). This is supported by the previous  
400 theoretical views (Kabeer, 2003; Sen, 1999) which emphasize moving beyond empowerment for  
401 the individual, to welfare enhancement for achieving lasting social transformation.

## 402 **CONCLUSION**

403 The PLA enabled the community to alter their perspectives as a result of learning from others.  
404 Such major shifts in perspective are not readily made, but this is where PLA comes into its own,  
405 managing divergent experiences and potentially divisive views. Participation is typically an  
406 adjunct to implementation rather than as a primary intervention. In the transparent, democratic,  
407 and dialogic PLA environment, the community may gain an entirely new perspective which  
408 prompts them to shift position from long-held patterns of belief or behavior.

409 The PLA enabled the community to work out a guideline for control of self-medication with  
410 antimicrobials which is suitable for them. Another key strength of this study was the  
411 commitment and the CHVs motivated as co-researchers. The PLA training is not limited to use  
412 in a single research project; once trained, peer researchers can apply PLA to any primary  
413 healthcare research topic. Ultimately, this builds the capacity of communities to engage in  
414 rigorous participatory research. The PLA, if well-facilitated, can have an integrating function  
415 that prompts broader social connections and enables empowerment at a low cost.

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537 **Table 1: Socio-demographic characteristics of 1531 people (household representatives [hr] and CHVs) SMWA PLA trained**  
 538 **by all empowerment domains**

Socio demographic characteristics	Power within		P value	Power with		P value	Power over		P value
	Yes	No		Yes	No		Yes	No	
<b>Age</b>			0.603			0.008			0.029
15-25	367(85.3)	63(14.7)		293(68.1)	137(31.9)		262(60.9)	168(39.1)	
26-35	600(83.1) 46.9*	122(16.9)		531(73.5) 48.3*	191(26.5)		398(55.1) 46.7*	324(44.9)	
36-50	247(82.9)	51(17.1)		227(76.2)	71(23.8)		153(51.3)	145(48.7)	
above 50	65(80.2)	16(19.8)		49(60.5)	32(39.5)		39(48.1)	42(51.9)	
<b>Gender</b>									
Male	268(77.2)	79(22.8)	<0.0001	251(72.3)	96(27.7)	0.816	195(56.2)	152(43.8)	0.816
Female	1011(85.4)	173(14.6)		849(71.7)	335(28.3)		657(55.5)	527(44.5)	
<b>Marital status</b>									
Single	286(84.1)	54(15.9)	0.072	241(70.9)	99(29.1)	0.121	198(58.2)	142(41.8)	0.134
Married	876(82.5) 79.0*	186(17.5)		766(72.1) 77.2*	296(27.9)		576(54.2) 77.2*	486(45.8)	
Divorced	18(100.0)	0(0.0)		12(66.7)	6(33.3)		13(72.2)	5(27.8)	
Widowed	77(91.7)	7(8.3)		56(66.7)	28(33.3)		53(63.1)	31(36.9)	
Separated	22(81.5)	5(18.5)		25(92.6)	2(7.4)		12(44.4)	15(55.6)	
<b>Family status</b>									
Father	252(80.0)	63(20.0)	0.002	233(74.0)	82(26.0)	<0.0001	174(55.2)	141(44.8)	<0.0001
Mother	881(86.0) 68.9*	144(14.0)		750(73.2) 68.2*	275(26.8)		599(58.4) 70.3*	426(41.6)	
Son or Doughier	70(78.7)	19(21.3)		62(69.7)	27(30.3)		38(42.7)	51(57.3)	
Others	76(74.5)	26(25.5)		55(53.9)	47(46.1)		41(40.2)	61(59.8)	
<b>Educational level</b>									
Illiterate	74(81.3)	17(18.7)	0.025	63(69.2)	28(30.8)	<0.0001	65(71.4)	26(28.6)	<0.0001
Read and write only	130(90.3)	14(9.7)		127(88.2)	17(11.8)		108(75.0)	36(25.0)	
Primary school	304(81.3)	70(18.7)		278(74.3)	96(25.7)		202(54.0)	172(46.0)	
Secondary school	448(81.5) 35.0*	102(18.5)		376(68.4) 34.2*	174(31.6)		291(52.9) 34.2*	259(47.1)	

College level	323(86.8)	49(13.2)		256(68.8)	116(31.2)		186(50.0)	186(50.0)	
<b>Occupation</b>									
Student	101(82.1)	22(17.9)	0.392	96(78.0)	27(22.0)	0.002	71(57.7)	52(42.3)	0.071
Government employee	68(87.2)	10(12.8)		56(71.8)	22(28.2)		54(69.2)	24(30.8)	
self employed	651(84.9) 50.9*	116(15.1)		577(75.2) 52.5*	190(24.8)		432(56.3) 50.9*	335(43.7)	
Employed by a private business	107(83.6)	211(6.4)		87(68.0)	413(2.0)		66(51.6)	62(48.4)	
Unemployed	352(80.9)	83(19.1)		284(65.3)	151(34.7)		229(52.6)	206(47.4)	
<b>Average monthly income</b>									
less than 5,000	897(85.0) 70.1*	158(15.0)	0.065	770(73.0) 70.0*	285(27.0)	0.020	586(55.5) 68.8*	469(44.5)	0.868
5000 to 10, 000	264(80.0)	66(20.0)		218(66.1)	112(33.9)		187(56.7)	143(43.3)	
> 10, 000	118(80.8)	28(19.2)		112(76.7)	34(23.3)		79(54.1)	67(45.9)	
<b>Approximate drug expenditure</b>									
< 500	827(82.0) 64.7*	182(18.0)	0.008	745(73.8) 67.7*	264(26.2)	0.025	548(54.3) 64.3*	461(45.7)	0.183
500 to 1, 000	193(82.8)	40(17.2)		165(70.8)	68(29.2)		142(60.9)	91(39.1)	
> 1, 000	259(89.6)	30(10.4)		190(65.7)	99(34.3)		162(56.1)	127(43.9)	
<b>Religion</b>									
Christian Orthodox	180(83.7)	35(16.3)	0.056	161(74.9)	54(25.1)	0.063	156(72.6)	59(27.4)	<0.0001
Christian protestant	640(86.1) 50.0*	103(40.9)		517(69.6) 47.0*	226(30.4)		374(50.3) 43.9*	369(49.7)	
Muslim	27(77.1)	8(22.9)		23(65.7)	12(34.3)		21(60.0)	14(40.0)	
Christian catholic	378(79.9)	95(20.1)		344(72.7)	129(27.3)		254(53.7)	219(46.3)	
Others	54(83.1)	11(16.9)		55(84.6)	10(15.4)		47(72.3)	18(27.7)	
<b>Health condition of the drug consumer</b>									
Pregnant	8688.7	1111.3	0.018	81(83.5)	16(16.5)	<0.0001	62(63.9)	35(36.1)	0.007
Breast feeding	154(78.2)	43(21.8)		139(70.6)	58(29.4)		107(54.3)	90(45.7)	
Has a chronic disease	77(77.8)	22(22.2)		59(59.6)	40(40.4)		56(56.6)	43(43.4)	
Child under 12	482(86.2)	77(13.8)		423(75.7)	136(24.3)		334(59.7)	225(40.3)	

years	37.7*			38.5*			39.2*		
13 -59 years	440(82.2)	9517.8		361(67.5)	174(32.5)		265(49.5)	270(50.5)	
> 59 years	40(90.9)	4(9.1)		37(84.1)	7(15.9)		28(63.6)	16(36.4)	

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541 NOTE: **1:** Values in bracket (), are % socio-demographic characteristic within a specified  
542 category. **2:** Values with \* are % socio-demographic characteristic within a specified category  
543 of empowerment.

544 **Table 2: The association between PLA domains and all empowerment domains as outcome**  
545 **variables for 1531 SMWA PLA trainees in Nyalenda B Ward**

	Power within			Power with			Power over		
	P	OR	95%CI	P	OR	95%CI	P	OR	95%CI
<b>Flexible learning and listening</b>	<0.0001	5.361	3.101-9.268	<0.0001	6.160	3.437-11.039	<0.0001	2.261	1.293-3.954
<b>Participatory evaluation</b>	<0.0001	7.711	5.184-11.459	<0.0001	5.012	3.375-7.443	<0.0001	3.618	2,375-5,509
<b>Participatory interaction</b>	<0.0001	7.823	4.798-12.763	<0.0001	8.610	4.987-14.866	<0.0001	4.003	2.325-6.693

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