The importance of being “linked”

Some relational maps on health and nutrition in Migori County, Kenya

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WeWorld is an Italian based international NGO. Its mission is to promote and safeguard children and women’s rights in the world. In Africa WeWorld operates in Benin, Kenya and Tanzania. WeWorld started operations in Kenya in 2009 focusing on education, health and rural development in the counties of Nyamira, Migori, Homa Bay and Narok.

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List of Acronyms

BoM: Board of Management
CHA: Community Health Assistant
CHW: Community Health Worker
CSO: Civil Society Organization
CU: Community Unit
GEWE: Gender Equality and Women Empowerment
HF: Health Facility
IGA: Income Generating Group
KRCS (or KRC): Kenya Red Cross Society
LC: Local Community
MCA: Migori County Assembly
MoA: Ministry of Agriculture
MoE: Ministry of Education
MoH: Ministry of Health
SNA: Social Network Analysis
OVC: Orphans and Vulnerable Children
RQ: Result Question
SILC: Savings and Internal Lending Communities
WW: WeWorld
The goal of the analysis is to use Social Network Analysis (SNA) techniques in order to identify and map relations among different key actors for health and nutrition issues in Migori, County in Kenya.

Social Network Analysis (SNA) is an interdisciplinary approach applying mathematical, statistical, computing methods in order to study social networks. "A social network is a set of socially relevant nodes connected by one or more relations. Nodes, or network members, are the units that are connected by the relations whose patterns we study. These units are most commonly persons or organizations, but in principle any unit that can be connected to other units can be studied as nodes." Hence, differently from a standard statistical analysis, SNA allows to detect the structural properties of any social action, to map the chains of connections, and to identify the existence of sub-groups of people highly connected.

The application of this method to map relations among people living in Migori County will allow to explore the texture of links of different stakeholders and hence to enable targeted policies. A particular attention will be devoted to health and nutrition issues and gender inequalities, so we focused on distinct stakeholders:

- institutions and organizations, direct actors in the decision making process and part of the civil society;
- “informal” actors linked to Community Units (CU), i.e. Community Health Workers (CHW), trained to be in touch with local population in order to diffuse the people centered approach, recently adopted in the Kenyan health system;
- income generating activities (IGA) groups coordinated by caregivers, i.e. people (mostly women) taking care of orphans and vulnerable children, OVC (very often children HIV-AIDS infected/affected). These IGA groups, involved in the WeWorld-Dala Kiye joint program (since 2011) and in the EU/Lombardy Region nutrition project (since 2016), carry out table banking/SILC activities in order to get a direct access to credit.

1. **The importance of being “linked”**


In this analysis, we present also some results we obtained from a pilot study in 15 schools in this area.

Although the study is a pilot, the main results are useful for future projects and field activities.

In April 2018, supported by WeWorld, we administered 275 questionnaires in the North-West region of Migori County (covering about 800 km²). Map 1 shows actors located in different areas of Migori County and details the categories of actors we interviewed.

<table>
<thead>
<tr>
<th>Actor type</th>
<th>Colours</th>
<th>People interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caregivers</td>
<td>yellow</td>
<td>189</td>
</tr>
<tr>
<td>HF/CU</td>
<td>green</td>
<td>39</td>
</tr>
<tr>
<td>Institutions</td>
<td>red</td>
<td>20</td>
</tr>
<tr>
<td>School</td>
<td>blue</td>
<td>27</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>275</td>
</tr>
</tbody>
</table>

Table 1: People Interviewed in Migori County

In this analysis we focus on a general research question (RQ): RQ: focusing on some key players in the Migori County, i.e. institutions, civil society organizations (here on CSOs), CHWs involved in CU and IGA groups, which are the main structural characteristics of their relations? In health and nutrition projects, are the relations cohesive and solid for all players, or are there preferential paths that strengthen connections leaving aside some parts of the Community?

Restricting the analysis to each category of interviewed subjects, we formulate 3 RQ:

RQ1: among institutions and CSOs interactions, which is the main network structure? Are there exclusive bridging actors that manage and coordinate all interactions impeding knowledge and information to flow in the network? Or differently, do the actors play very similar positions enabling constant and continuous flowing of information and knowledge?
RQ2: Considering health and nutrition issues, which is the organizational structure among CHWs operating in 10 CUs? Is there a unique structure that is “interconnecting” CUs across geographical space? Or, do CHWs interact within CUs characterized by “informal” borders impeding information and knowledge on health and nutrition to flow easily?

RQ3: IGA groups mainly constitute a unique access to credit for many women in the County. Which are the main network features of generic economic advice in IGA groups? Are there similarities or differences between economic activities networks and health and nutrition networks among different IGA groups? Is the official role played by IGA members determinant in enabling relations in the network? Are there important gender differences that characterize the network?

As defined previously, SNA requires nodes and links. In this research each “node” is any interviewed person or a cited person. The “link” represents a relation connecting two nodes, has a direction reflecting the orientation of the link and a weight, i.e., the intensity or the frequency of the relation. Graphically links’ direction is identified with an arrow and the weight is defined with link width: the higher is the frequency, the thicker is the line.

In this report we will present the main results on the mapping of relations and we complete the report with some final considerations.

---

3 We interviewed 275 persons but in total we are dealing with more than 500 nodes. Each respondent was able to fill-in a list of actors and to add as many actors as necessary, if relevant for respondents.

4 The direction indicates if the node is a “source” of the tie, or a “sink”, or both (i.e., mutual links). If the link is mutual, i.e., a relation between two nodes is both sent and received, it means that actors involved in the relation are extremely familiar with each other, hence they are used to interact, and the costs of interactions are very low.
2. Institutions and CSOs

Between mid-April and beginning of May 2018, we administered 20 questionnaires to 8 main institutions or CSOs (Figure 1) located in Map 1. We interviewed 15 male and 5 female, aged 44 on average, and most of them (11) with a secondary school diploma, 8 have a university degree, and 1 a Ph.D.

All interviewed persons are full time employed, work in these organizations since long time⁵, and 4 of them started working a couple of years ago. In general we conclude that their experience in these institutions and CSOs is consolidated, knowing several aspects of the mechanisms of interactions in their organizations. In addition, all of them are multitasking playing more than one role: these people declare to play coordination, administration, advocacy and communication roles.

Figure 1. Institutions and CSOs interviewed

Hence the persons we interviewed are fully entitled in answering this questionnaire on the interactions with other institutions and/or CSOs.

⁵ Some of these persons have been working in the institutions and CSOs since the beginning of 2000's.
Results: networks

SNA enables to create the map of relations as detected through interviews. We asked respondents to mention how frequent was the interaction and the reason of interaction within a list of actors.

Once an interviewed person A (i.e. a generic node A) answers that there exists an interaction with a cited person B (i.e. a generic node B), a “link” is created from A to B, where A originates the relation and B is the sink of the relation. The arrow indicates this direction of relations, i.e. the source and the destination of the relation.

According to the answers, we create the whole network of relations as in Figure 2.

Figure 2. Network among institutions and CSOs (87 nodes)
In brief each node represents a person interviewed (i.e. the shape is a box) or cited (i.e. the node shape is a circle) and we assign different colors according to the institutions they belong to. The width of the link represents the intensity of the relation: from the thinnest, i.e. at least once, to the widest, i.e. always\(^6\).

In figure 2a we included information on the reasons of interactions. In total we identified 7 different types of relations, but we will focus mostly on “health and nutrition” (cyan color) or “training and coordination” (black color)\(^7\).

As shown in Figure 2, the network does not include exclusively the respondents (i.e. 20), but 87 nodes (i.e. more than 60 new actors complete the network, which is quite complex). On average each node has 3.6 direct links\(^8\), i.e. each node is connected to 3.6 actors in the network without any intermediation. This index reflects the ability of a node to get direct relations: any person in the network is in direct touch with more than 3 other persons.

As declared by respondents, interactions could have happened place at least once, sometimes, often, always\(^9\).

The distribution of links is uniform: links values are equally distributed among these 4 frequency classes. Nevertheless, this distribution does not guarantee the network to be fully linked.

Mutual links\(^9\) i.e. reciprocated links, are about 30% of total links: this indicates that the interaction goes on both sides, transaction costs are very low and this simplifies the interactions.

Three main features emerge in this network of 87 nodes.

Firstly, if we keep exclusively continuous and constant relations (i.e. labeled as always and the thickest in the graph), the network does not completely collapse: some isolated actors\(^10\) emerge, but several sub-groups remain connected. In other words, keeping exclusively continuous relations, nearly one quarter of total links, create a network with 44.8% of total nodes which is isolated, but the majority of nodes (i.e. 51.7%) is connected in the biggest sub-group\(^11\) (Figure 2b).

This result confirms that stable relations constitute a texture of the relations among institutions and CSOs enabling continuous interactions for Migori County.

Secondly focusing on the 20 respondents sub-network, we visualize a very connected network (Figure 3a). The average degree is 5.65, i.e. each respondent has on average more than 5 partners, and continuous relations create pretty homogeneous sub-groups characterized by “similar” actors within the same institutions and/or CSOs (i.e. LC and MoH) (Figure 3b). This result confirms that the organization within the same institution enable connections, as in any organizational study.

Interestingly, among these stable relations, the most heterogeneous group involves WW and Dala Kiye, confirming the roles of NGO’s in connecting actors in Migori County. Focusing on the reasons to establish connections, most of the stable links are related to “training and coordination” issues, “health and nutrition” and “agricultural activities”.

Thirdly, among the reasons enabling connections, generic “training and coordination activities” represents the most cited purpose of interactions meaning that the basic reason for being connected is the need to learn and harmonize activities among institutions and CSOs.

Since the organizational pull emerged and since the RQ1 is devoted to the mapping of connections among institutions and CSOs, we aggregate\(^12\) actors according to main institutions and CSOs and we got a network with 13 institutions and organizations (Figure 4).

While the network of “training and coordination” is highly connected with no central nodes managing the whole structure, “health and nutrition” and “agricultural activities” networks show peculiarities to focus on. In the “health and nutrition” network (Figure 4a), the Ministry of Health (MoH) is the most central actor conveying many relations of institutions and CSOs. This result seems quite trivial,

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6 Questions allowed answering also “never”, but since the complexity of the networks, we excluded this information from the network.
7 Other colors refer to “agricultural activities” (brown color), “school and children care” (orange color), “disaster management” (red color), “Gowr” (pink color), “Other” (blue).
8 The average degree is computed as the total number of links registered in the network and the total number of nodes belonging to the network (Wasserman, S., and Faust, K., (1994). Social Network Analysis: Methods and Applications. Cambridge University Press. Cambridge).
9 Considering a relation between two generic nodes A and B, we consider a link mutual when the relation is both sent and received. The mutuality could imply that actors involved in the relation are extremely familiar with each other, hence they are used to interact, hence the costs of interactions are very low.
10 An isolated node has no links with no node in the network. Hence an isolated node is excluded from relations occurring in the network.
11 The remaining nodes are linked in small subgroup with 3 actors.
12 Those subjects belonging to the same institution or CSOs are aggregated in one “node” representing the institution. This aggregation procedure allows us to get an overall picture of the network among institutional and organizational agents.
Figure 3. Network among 20 respondents

a) all relations

b) stable relations only

Legend:

considering the object of the relations (i.e. health and nutrition), but if we focus on other players, i.e. Dala Kiye and LC, we realize that these are crucial in preserving the connections with the MoE and MoA\textsuperscript{13}. Considering that this network is dealing with “health and nutrition” activities, the result that CSOs, LC and other Ministries are actively involved constitutes an important goal in the strengthening of these topics among the stakeholders in the Migori County.

In the “agricultural activities” network (Figure 4b), we observe a quite different structure with different positions played by the key actors. MoA, the ministry mainly linked to this issue, is not the most central actor, although is maintaining several relations connecting other Ministries and CSOs. In fact, the most central player is the LC indicating that, at the County level, is an essential actor in connecting several parts of the Community.

These results show that connections on specific topics do not necessarily match with the centrality of the corresponding institutional node (e.g. agricultural activities and MoA). In other words, the network of connections could be developed thanks to the intervention of other actors, like CSOs, that enable the transmission of information without entirely substituting the official institution, but juxtaposing it.

\textsuperscript{13} Removing the most central player, MoH, does not interrupt the flow of communication among players.
Figure 4. Institutional and CSOs networks in “Health and nutrition” (panel a) and “Agricultural activities” (panel b)

Concluding on these maps of relations.
Apart from “training and coordination network”, which is quite complete, with no star actors managing all connections, with stable and mutual relations, other thematic networks (“health and nutrition” and “agricultural activities”) are very peculiar since institutional players are central in linking the whole network, but they are not always essential since the role played by CSOs is important as well. Hence in Migori County, the network of relations among formal institutions, CSOs and local partners is not fragile since central positions are diffused among several actors.

Strengths and weaknesses of the relations
Finally, we complete the mapping of relations investigating the overall strengths and weaknesses declared by respondents when considering the interactions mentioned in the relations they maintain nowadays.

Figure 5 shows results on word clouds\(^\text{14}\) for overall strengths (panel a) and weaknesses (panel b). Project, that are implemented, constitute a force. Followed by community based activities, as shown by words like inclusion, consultation, coordination, community, integration.

The panel related to the weaknesses shows the need for more meetings and follow-ups on the activities and, in some cases, the lack of transparency.

Hence concluding, word clouds and the maps of relations confirm the role played by the “community”, as a concept and as an integrated system of connections emerging from the networks.

\(^{14}\) The word cloud is a frequency map for words: the dimension of the words is associated to its frequency. For example if a word is repeated several times in the text, its relevance appears in the map (e.g. project versus training).
Figure 5. Word clouds for institutions and CSOs in Migori County

Strengths

Weaknesses
3. Community-based activities in the health system

We administered 39 questionnaires in CU and HF (located in map 1) between mid and end April 2018 to CHW (28), CHA (6) and nurses and clinical officer (5).

The Kenyan health system has been experiencing an important reform since 6 years ago. Hereafter we decided to focus the analysis on the CUs and HFs in order to map the connections responsible for the diffusion of the people-centered approach. In particular we focused on 3 different figures: CHW, CHA and Nurses/clinical officers.

The CHWs constitute the direct link between the community and the Kenyan health system, in fact they meet people in their houses, disseminate information on hygiene procedures, on screening children, diffuse information on nutrition and health best practices, to mention just a few of the CHWs duties.

The CHAs are responsible for the CUs, they coordinate and supervise CHWs in the CU and constitute the direct link with health dispensaries in the territory. Any kind of health campaign diffused by the national health system is communicated also to the HF, hence CHAs are acknowledged and finally CHWs diffuse “personally” the content of the campaign to the rural community.

Nurses, clinical officers and doctors play a professional role in the health system, their role is devoted mainly to patients care, but also to communication and dissemination of information, mainly due to of lack of human resources.

In this sample, female are double than male and 61% of all respondents hold a diploma. On average they are about 40 years old. For the majority of people, the working experience in the CU started more than 4 years ago, hence we can state that this working experience is quite stable and is evolving with the Kenyan health reform.

In this sample, most of these persons have been trained on several issues, like screening of children, improved hygiene practices, HIV/AIDS, development and implementation maternal and child nutrition, capacity building and training and assistance to caregivers to use optimal nutrition at home.

Any CHW refers to “informal” and basic community-based structures, like a CU, which could be associated to dispensaries or other health facilities. In the following analysis, we will analyze the networks of relations according to 10 CUs (Table 2). In total, we interviewed 43 different roles, defined as in table 2.

Table 2: People interviewed by CU

<table>
<thead>
<tr>
<th>Community Unit (CU)</th>
<th>CHA</th>
<th>CHW</th>
<th>NURSE/CLINICAL OFFICER</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALENDO</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>AMOYO</td>
<td>1</td>
<td>9</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>BANDE</td>
<td>1</td>
<td>10</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>GUNGA</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>KAKELO KAKOTH</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>LWANDA</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>OKAYO</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>OTATI</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>SORI</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>WINAM</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td>28</td>
<td>5</td>
<td>43</td>
</tr>
</tbody>
</table>

15 In the last 15 days before the interview, about 3000 people accessed the CU, the majority were children with less than 5 years (836), followed by women in fertile age (700) and children between 5 and 13 years old (642).

16 We interviewed 39 persons, but some of them play different roles in different structures. We track these identities and we show these results on the networks. Since the entire analysis on the mapping of relations among different community units, we include 43 different “actors”.
Results: transferring acquired knowledge

All CHWs we interviewed declare to disseminate health questions to the whole community, and they should be the ideal connection between the entire community and, in general, the national health system. But when we ask whom they transfer their knowledge (i.e. giving advice/help), children and close relatives are the major recipients of their acquired knowledge (Figure 6).

Figure 6 shows the frequency of interaction with 6 categories of persons (i.e. brother and/or sisters, my children, my friends, my neighbors, my nephews, grandchildren) for some trainings. Interestingly, children are the major destinations of transmitting knowledge on regular base. Hence even if these persons declare to disseminate knowledge on different topics as a duty, when we ask them to identify to whom they directly pass the acquired information, the major recipients are children, with whom they share everyday life and the interactions are facilitated thanks to a direct and shared language. In other words it is easier to communicate with them.

There could be a sample bias: 26 out 39 interviewed are women who are more willing and used to fulfil their educative role towards their children by transferring them attitudes and knowledge, in addition they spend more time with their children compared to other people. Finally it might also be that the people interviewed feel that children are the most important recipients of the acquired knowledge.

Certainly, these aspects represent a possible interpretation of the answers, but there is no doubt children are considered the recipients of the acquired knowledge, with no differences in topics.

Figure 6: Passing knowledge to other people

Optimal nutrition at home

HIV/AIDS related issue

Improved hygiene practices

Counselling about care, support, early cognitive and social stimulation for children
**Results: networks**

In order to map the relations among the community-based health system, we asked subjects whom they ask and who asked information on doubts on health or nutrition within the CU/HF.

The final network we obtained is a structure including 145 different persons and is mapped in figure 7a. On average each actor maintains approximately 2 direct relations (average degree is 2.38).

A very interesting feature emerges immediately: a unique connected network pops up with no disconnected components and no isolated nodes. This result is particularly surprising if we consider that not all CU are geographically nearby, and the logistics is very compromised, especially during the flooding season.

Figure 7a shows that clusters of similar nodes located in the same CU experience higher density of links, but in general the network of advices overtake the borders of the CU. This result confirms that CU and, in general HF, link people and their “borders” are not impeding relations to emerge. In other words, people do not maintain exclusive relations inside each the CU, but when doubts on health or nutrition procedures emerge, answers are acquired within and outside the CUs. If the most efficient answer is located in another HF or CU, people look for it regardless to the CU they belong to.

A possible explanation to this interesting result, is related to the fact that most of interviewed people were trained together in the past. This could explain the connectedness of the network: past trainings constitute good opportunities for people to meet and get in touch, building a peer community to contact when some procedural doubts arise.

Looking at gender, the network does not show any particular pattern driving linking formation. In fact, male and female interact with each other with no segregation. This should be considered a good result in this work experience.

Interestingly for several CUs (Alendo, Bande, Lwanda, Okayo, Amoyo and Kakelo Kakotha) a key player is the Ministry of Health (MoH), the institutional subject responsible for these issues.

The results on figure 7a are particularly interesting if we compare this network with the network of daily working issues shown in figure 7b.

Firstly the number of persons involved is nearly a half if compared to the “doubts” network (82 versus 145 actors). In particular average degree is lower (i.e. 1.38), meaning that on average the direct interactions related to working issues are with approximately 1 person.

Secondly, the network is not connected, but there exist 8 subgroups of nodes corresponding to different CUs, meaning that daily working relations are limited within CU borders, probably due to organizational issues. For these issues there is no need to enlarge the relational structure of advices outside the CU. There is only the exception connecting Alendo, Okayo and Otati CUs. A possible explanation could be that these CUs are approximately located nearby and respondents are working in two CUs at the same time. Hence the geographical proximity and the shared positions in different CUs enforce the creation of subgroups.

In conclusion, we can state that the CHWs and CHAs network is well connected in a unique structure of relations with no formal borders defined by CUs. The people-centered approach is effective in connecting people working on this first step of the Kenyan health system, since no breaks disconnect the network of relations. However, although the majority of links connecting the whole network involve CHWs and CHAs, the role of the MoH is crucial in maintaining connected some sections of the network confirming that for these communities the role played by the institution is crucial in disseminating information on health and nutrition doubts.

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17 Same CUs are represented with the same color of nodes.
18 All interviewed persons were trained by WW activities: only 2 out of 39 interviewed persons were not trained by WW.
Figure 7: CU networks

a) Doubts on health and nutrition procedures (145 actors)

b) Working issues (82 actors)

Legend:

- Alendo
- Bande
- Joint
- Lwanda
- Okayo
- Sori
- Amoyo
- Gunga
- Kakelo Kakoth
- Moiif
- Otati
- Winam

Nutrition sensitization by CHW in the community
4. Income Generating Activities of Caregivers Groups

In Kenya, IGA groups consist of groups of people meeting together to carry out small businesses with the aim of increasing their own income. WeWorld and its partners support IGA groups composed by caregivers (e.g. mothers, fathers or guardians) within the nutrition programme co-funded by EU/Lombardy Region. Usually IGA groups of caregivers are already existing groups meeting for other purposes, and deciding to carry out table banking/SILC activities to increase their capacity to access credit. WeWorld’s initial support consists in giving technical assistance to IGA groups through entrepreneurial and technical training, and also by creating a continuous link with relevant Ministries which offer capacity building for sustainability purposes. At this stage, the economic support is given by financing IGA economic activity proposal\(^{19}\) in terms of material and equipment. At the end of the project the IGA group, which should have reached a certain degree of self-sustainability, is supported through continuous technical assistance offered by the extension officers from the concerned Ministries, and the group economic and financial decisions are managed by the group itself, on the basis of the needs of the local market.

IGAs groups are mostly constituted by women. This is due to two main reasons.

Firstly within the community women are actively enrolled in daily activities such as farming, which are normally selected as IGA activities (see table 3).

Secondly, women are considerd to be at lower risk of default in their repayments to the group and since table banking/SILC activity originating from IGA groups is mainly lending and loaning, women are mostly involved.

In conclusion these IGA groups are interesting to analyse since they reflect the ability of people to coordinate in order to follow a common goal, the success of a common business, and because we have the opportunity to verify if the formal structure of relations exactly matches with bottom-up relations.

Results: main IGA groups features

During the mid of May 2018 we interviewed 189 members belonging to 7 IGA groups\(^{20}\) of caregivers located as in map 1.

WeWorld trained all groups we interviewed with some basics of entrepreneurial activities, agricultural and farming activities and food security. Usually these people met during trainings, or at schools, hence decide to start a business and get initial support by WeWorld. On average, each caregiver in any of these IGA group has 3 orphans\(^{21}\) (total or partial) to take care of.

All these IGA groups started their activities several years ago, about 6 years ago (Table 3), and groups activities are nowadays quite differentiated (e.g. Gunga, Otati, Sori, Wachara), meaning that groups are stable and able to generate economic gains. In general, all groups are devoted to farming and agricultural activities.

In these groups, 90% of people are women. Caregivers age is very wide between 19 and more than 60 years old, with a distribution picking twice between 25 and 35 and more than 60\(^{22}\). The majority of people has primary school level (40%), 30% is not be able to write and read, and 27% is able to read and write\(^{23}\).

The majority of interviewed people works as “farmer”, “small business”, or “occasional work” (Figure 8). Very few of them declare to be exclusively housewife (2.6%) or jobless (1.6%) at the moment of the interview.

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\(^{19}\) Usually WeWorld selects and finances those business plans that seem more plausible and presented by IGA groups that, by and large, have been existing and functional since several years, as a guarantee of sustainability.

\(^{20}\) These 7 groups have 243 members in total, hence we got a quite good response rate, i.e. 77.8%. We should stress that all members present during the questionnaires administration answered. The non-response rate is due to climatic conditions, which impeded members to reach the IGA meeting, and Community conditions involving members in other events.

\(^{21}\) This situation on OVC is extremely dramatic due to the high HIV/AIDS rate that wiped out several families leaving caregivers and grandmothers to take care of children.

\(^{22}\) The fact that older women are members of the IGA groups may be related to the fact that they have more spare time to devote to IGA activities. In addition, according to African culture, OVC should not be left by his/her own, hence relatives and neighbors take care of them, even if no kinship is at place.

\(^{23}\) All interviews were carried out by interviewers translating in local language questionnaires and helped people to fill in the questionnaires.
Hence in general, the majority of these persons already have expertise in managing economic activities, and mainly they use the IGA group activity in order to increase their access to credit mainly to afford school fees.

(Figure 9). As shown in figure 9 nearly 40% of earnings from table banking/SILC activities is devoted to pay school fees24, nearly 40% to manage own business, and the remaining destinations are devoted to daily life expenses, i.e. for health payments, to buy primary goods and staff for the house. In other words, in the majority of the cases IGA group activity is considered a “not risky” activity to access credit.

24 In Kenya and in Migori County, primary schools are public and no fees are officially required, but on average per year a family’s contribution is 900/950 KES per children. This contribution includes exam fees (150/200 KES), refection, hiring of community teachers, infrastructure maintenance, and so on.
Finally money received from IGA group could vary a lot (as shown in Figure 10). We see that the majority of earning ranges from 0 to 5000 KES, an amount of money to cover primary needs and school fees; hence within the range from 5001 to 20000 KES a member could guarantee a medium-high income level; and finally from 20001 KES on people use these earnings to invest money in their own small business.

**Figure 10: Earnings distribution (in KES)**

![Earnings distribution chart](chart.png)

Table 3: Caregivers groups description

<table>
<thead>
<tr>
<th>Name</th>
<th>Date of creation</th>
<th>Other groups in the school</th>
<th>Membership</th>
<th>Business</th>
<th>They changed business since the beginning</th>
<th>Reference school</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alendo B</td>
<td>Nov 2012</td>
<td></td>
<td>33</td>
<td>Goats: milk and meat</td>
<td>The initial greenhouse business was damaged by salty water</td>
<td>St. Joseph's Alendo Primary School</td>
</tr>
<tr>
<td>Wachara A</td>
<td>Oct 2012</td>
<td>Wachara B</td>
<td>28</td>
<td>Goats: milk and meat Tents and chairs for public events</td>
<td>The initial business was production of goats milk and meat</td>
<td>Wachara Karungu Primary School</td>
</tr>
<tr>
<td>Gunga</td>
<td>Dec 2012</td>
<td></td>
<td>42</td>
<td>Goats: milk and meat Tents and chairs for public events Green house</td>
<td>The initial business was goats farming</td>
<td>Gunga Primary School</td>
</tr>
<tr>
<td>Sori Mlimani</td>
<td>Dec 2012</td>
<td></td>
<td>42</td>
<td>Tents and chairs for public events Sound system and generator Green house</td>
<td>NA</td>
<td>Sori Primary School</td>
</tr>
<tr>
<td>Sidika C</td>
<td>Nov 2012</td>
<td>Sidika A and Sidika B</td>
<td>29</td>
<td>Goats: milk and meat</td>
<td>NA</td>
<td>Sidika Primary School</td>
</tr>
<tr>
<td>Otati</td>
<td>Feb 2012</td>
<td></td>
<td>40</td>
<td>“Goats: milk and meat Cassava production Selling water to local community”</td>
<td>The initial business was production of goats milk and meat</td>
<td>Otati Primary School</td>
</tr>
<tr>
<td>Rabuor Karungu</td>
<td>Jan 2012</td>
<td></td>
<td>29</td>
<td>Green house</td>
<td>NA</td>
<td>B.L. Tezza Complex Primary School</td>
</tr>
</tbody>
</table>

**Results: networks**

Although, we interviewed 189 people, only few of them did not reply to any network questions, mentioning nobody they are related to in the group, neither asking nor giving any advice in economic activities or health and nutrition issues. Only 17% of total respondents did not answer on networks questions, mainly suggesting that no relations are at place.

In order to define the economic advices and health and nutrition networks we asked how often the interviewed persons gave and received advices regarding economic activities and health and nutrition issues within the IGA group. For economic advices almost half of the interactions is very frequent (i.e. “once a week” and “daily”); while the occasions to discuss about health and nutrition matters are less frequent, but not absent. Probably these results are driven by the fact that any IGA group should meet at least once a week in order to plan overall group activities. But this result provides some reflections.

On the one hand it is quite trivial to note that these IGA groups discuss about economic activities, since their nature is mainly economic and their experience started several years ago. On the other hand, it is worth noting that health and nutrition issues represent objects of frequent discussions, even if the WeWorld project on health and nutrition started only a couple of years ago. We could imply that IGA groups constitute a good opportunity to meet and exchange

25 Among all groups only Rabuor Karungu shows a very high no respondent network rate (43%), more than 2.5 time the average, due to contingency reasons that reduced the presence of members’ group during the interviews.
information on several topics, not exclusively related to economic nature.

Nevertheless, for this initial preliminary analysis, on mapping relations inside the black box of relations in IGA groups we will not distinguish among declared frequencies of interactions.

The maps of relations show interesting features.

In general, any IGA group is not completely connected, but has sub‐groups (see some examples in figure 11). None of IGA groups is completely connected, in particular there is always a giant component (which is including the majority of people) and smaller subgroups (i.e. dyads26, or triads27, or bigger sub‐groups).

This indicates that, although the IGA groups are cohesive in their final goal, the network of advices is not a unique connected network of interactions, since actors activate sub‐groups with exclusive relations.

Figure 11 shows 3 interesting cases of the differences between economic networks and the health and nutrition networks within the same IGA group.

Alendo is an interesting case since in the economic network there are more persons involved if compared to health and nutrition network, and structures are completely different: the main component characterizing economic activities completely disappear in the second network and central players (e.g. cg118) become less central. Other subjects, previously connected (e.g. cg128 and cg102) separate in different networks. This result reflects that in these topics leadership are pretty different.

Gunga and Sidika show a different pattern: the number of persons in health and nutrition networks is higher than in the economic activity network, but structures are different.

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26 A dyad is a mutually exclusive sub‐group including only two subjects.
27 A triad is a sub‐group including only 3 subjects.
In Gunga some sub-groups are tightly connected and cohesive in both networks (e.g. cg327 and cg364, or cg309 and cg365); other persons constitute the exclusive connection for other people (e.g. cg301 and its direct relations). Nonetheless the overall structure of the biggest sub-group is very different in the two networks: a circle structure characterizes the health and nutrition network, with links passing exclusively to neighbors, while the economic activity network is not circular at all. An interesting switch of network position is played by member cg307, which is pretty marginal in one network, and crucial to connect several persons in the health and nutrition network.

Finally Sidika is an interesting example of a pretty stable sub-group centered on a pivotal person (cg 609), who is monopolizing relations of several subjects, but interestingly in the health and nutrition network she is exclusively receiving advices. The main sub-group is characterized by complex and quite different structures, but in both networks relations are very frequent indicating continuous and constant relations.

In all networks, on average, a member has 2 persons with which she/he maintains interactions. The highest average number of links is in Sidika C economic activities, with more than 3 persons. In general, in economic activities networks the average degree is higher, i.e. caregivers maintain more relations with people (i.e. alters), if compared to health and nutrition networks.

The average distance among persons involved in the network (average distance, or shortest path between two persons) is higher in economic networks, if compared to health and nutrition (the only exception is Sidika IGA group). This result shows that for health and nutrition issues passing information among any pair of persons selected in the network is faster: on average, health and nutrition networks seem more efficient since they require less intermediate passages.

In all IGA groups, economic activities and health and nutrition network structures are pretty different. Some groups show
very hierarchical structures, where starring persons channel the majority of interactions (e.g. all star sub-networks as in Sidika); while other groups show more egalitarian structures with no key actors (e.g. Sidika’s economic activities network).

In each group, there are important differences between economic activities networks and health and nutrition issues, meaning that relations inside the groups are very different.

Concerning to “gender”, we find mixed results. The literature on SNA suggests that in many social networks common properties of nodes (e.g. gender) increase the probability to establish relations. In these IGA networks we cannot conclude that relations are (or not) driven by gender. In other words the assortativity indexes we computed in order to detect the role played by gender do not show unique results: in some cases gender is crucial to trigger relations (as in Otati health and nutrition network) and sometimes this is not the case (as in all Alendo networks). This puzzling result, that needs to be further investigated, could be related to the over representation of women in the sample.

With regards to “institutional players”, i.e. chair, secretary, treasurer and money counter, in all networks at least one of them is cited, hence he/she is involved in economic and health and nutrition interactions, but their role is not necessary central. In fact in some IGA groups there is an exact matching between the group leader (as a person central in the network) and the institutional leader (as elected in the IGA groups), but in other IGA groups this is not the case. This interesting result confirms that the leadership of the group varies according to the topics (i.e. economic and health and nutrition issues) and to the perception of the entire group.

In conclusion, all these networks show interesting differences among IGA groups, characterized by very dissimilar structures. Further analysis on determinants of links (e.g. position in the network, level of trust on others) could help to highlight some puzzling features of these networks.

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5. Schools: a pilot study

This pilot study that took place at the beginning of April 2018.

We interviewed 27 actors belonging to 15 schools located in the North-West region of Migori County (Map 1). We interviewed different actors in schools in order to depict different perspectives: Teachers (T) who are directly in contact with students, Head Teachers (HT) considered bridging persons between students and the community of teachers, and finally Board of Management (BoM) managed by children’s parents with supervising duties. In 4 schools we interviewed all these roles, (i.e. BoM, T and HT), while in the remaining schools only T, HT or BoM.

Since HT and BoM and T cover different roles, we formulated different questionnaires. In particular, all 6 Teachers were interviewed in order to verify if the transmission of knowledge acquired during trainings passed to the community as a whole. Differently, questionnaires for 6 Board of Management (BoM) and 15 Head Teachers (HT) were devoted to identify relations among schools actors.

Some findings on Teachers

The teachers we interviewed are 3 male and 3 female, aged between 25 and 40 years, with the same educational level (i.e. high school).

Since these questions are implemented in order to identify how often teachers practice the knowledge they are trained on, we present results in Figure A and B. Figure A shows that training on HIV/AIDS, Child Rights and development and daily practice on hygiene are always discussed at schools with students. Less discussed are the issues on nutrition.

Figure B is devoted to the interaction with colleagues. Differently from students, issues which teachers are trained on several topics are not always practiced with colleagues.

Perhaps this is due to the fact that, in many schools, the majority of teachers are trained, hence no further discussions arise, or that some trainings have only been introduced a couple of years ago by the EU/Lombardy Region co-funded project implemented by WeWorld and its partners.

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30 Most of the trainings were sponsored by WeWorld, but also by other ONG and by programs of the government. In particular we focused on the following WW training programmes: Child Rights & development; Nutrition; Early cognitive/social stimulation; HIV/AIDS; Improved Hygiene; Sanitation/hand washing; Communication system in the school and communities; Counseling about care, support, early cognitive and social stimulation for children.

31 This result could be due to the fact that students benefit by the correct application of nutrition information, but they are not directly involved in these areas such as preparation of food, which are mainly managed by their mothers/grandmothers of elder siblings in the family. It could also be due by the fact that the nutrition trainings are more recently implemented 2 years ago in comparison of the trainings on other topics which started in the year 2011.
A slightly different perspective was designed to map how much teachers diffuse their knowledge on trained topics not directly to students and colleagues, but to their families: students’ parents (Figure C) and caregivers (Figure D). Interestingly, the results for children’s parents show no difference in behavior, i.e., teachers do not seem to distinguish in passing the knowledge to mothers and fathers. Communication with caregivers is similar to parents (with the only exception of category Early cognitive/social simulation which is much less frequent for caregivers if compared to children’s parents).

Hence, these results would confirm that parents and caregivers are equally considered in the transmission of knowledge on different topics.

For this reason, we decided to provide the same graph for both parents, since answers did not show any difference in communicating these issues.
Some findings on Board of Management and Head Teachers networks

We interviewed 21 persons, 16 HT and 6 BoM, almost all respondents are male with the only exception of 2 female BoM. On average, these subjects are older than T, i.e. 50 years old, with different educational levels: primary school (5%), secondary school (57%) and university level (24%).

Relational questions are devoted to detect the network interactions with other individuals for different purposes.

The analysis of the relations declared by the actors shows quite a complete structure (Figure E).

Each node represents a type of actor: circles identify all BoM and HT we interviewed; squares identify cited actors belonging to different categories, and directed links show the direction and the frequency of the interaction.

We identified 6 categories of actors: NGOs, Community structures (COMM), other schools (SCHOOL), the Ministry of Education (MoE), the Ministry of Health (MoH) and other governmental agencies (GOV).

The width of links identifies the intensity of relations: thickest and darkest links identify numerous links, while grey and narrow links less frequent interaction.

On average each actor has a 3.5 links, meaning that on average each institution maintains more than 3 connection within this structure.

If focusing on the motivations that enhance relations among actors, interesting features arise (see Figure F). A detailed analysis of the reasons of interactions shows the constant involvement of NGOs in each kind of interactions among BoM/HT and all institutional actors, although specificities clearly emerge. For example for educational issues (EDU), the MoE is involved (as expected), the same applies to hygienic (HYG) and health (HEA) issues, when MoH is part of the network of interactions. Interestingly, for issues like infrastructure development (DEV), communities, NGOs and governmental institutions create a network of interactions where the missing links are the absence of MoE, and between BoM and HT. In addition it is worth noting that relations managed by HT and BoM are symmetric (i.e. send and receive links) but interaction among them is completely absent.

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33 We categorized motivations of interactions according to different classes: Nutrition (NUT); Health (HEA); Hygiene (HYG); Child Rights (CR); School Infrastructure Development (DEV); Education (EDU); Coordination issues (COO); Farm and agriculture and spiritual needs (OTHER).

34 We should stress links among NGOs, COMM, SCHOOL, MoE, MoH and GOV are absent since these actors were not interviewed, hence relations are not mapped in this phase of the interviews. Differently, since BoM and HT were both interviewed, it is clearly a matter of facts that no relations emerged.
Figure F. Network of BoM and HT: detailed objects of interactions

HEA

CR

NUT
Three main results emerge:
- the leading role played by NGOs in interacting with schools;
- mostly unbalanced relationships within the system of education (i.e. schools and MoE and BoM/HT);
- the complete absence of relations between BoM and HT.

This picture, although obtained interviewing few actors not representative of the schools in Migori County, gives useful hints to be further investigate and eventually implement plans involving more intensively the education system.

**Strengths and weaknesses of the relations**

Finally, we complete the mapping of relations investigating nowadays relations’ strengths and weaknesses stated by BoM and HT.

Word clouds showed in figure G refer to strengths and weakness. Immediately it appears that general improvements are observed, if compared to the past (in fact the most frequent word is referred to something that improved or improvement or good). Secondly, several strengths refer to teachers, pupils, but also to schools’ infrastructures (e.g. toilets, infrastructure, sanitation, classrooms, facilities). Thirdly several terms refer to enhanced coordination, training, management.

Among the weaknesses, it clearly appears that funds constitute a fragility. Several motivations given by the interviewed persons suggest that the lack, the delay, the inadequateness of funds constitute the major weakness of nowadays interactions.

Interestingly school is both a weakness and a strength, meaning that it represents “two sides of the same coin” to work on.
Figure G. Word clouds for schools

Strengths

Weaknesses
6. Final conclusions

As far as it concerns the characteristic of the relations with institutions and civil society organizations in Migori County, our results confirm the presence of stable relations among institutions, organizations and the civil society; this clearly allows continuous interactions useful for the County.

The focus on Institutions and CSOs shows some interesting results. First of all the analysis points out that belonging to the same institution or organization enable connections, as in any organizational study. But in this research even the role played by NGOs emerges in connecting actors in Migori County: in “training and coordination” no star actors are at place given the inclusive nature of the activity. Interestingly in “health and nutrition” and “agricultural activities”, key players are the Institutions, nevertheless CSOs are crucial as well.

Focusing in particular on health and nutrition projects we find that in this network the majority of links is among ministries governed by Ministry of Health, as can we expect it to be. Nevertheless other actors from civil society are relevant as well in connecting institutional and organizational actors. This is important in the view of present and future efforts to promote a more holistic and multi-sectorial approach to nutrition, which encompasses not only the nutrition-specific aspects (health-related), but also the nutrition-sensitive ones (related to agriculture, water and sanitation, education, resilience and all the many sectors playing a key role in nutrition).

Looking at what we defined strengths and weaknesses, we find out that all community based activities constitute a strength, as shown (in the word cloud figures) by words like inclusion, consultation, coordination, community, integration. Even projects, that are implemented by CSOs, are considered a strength. The side of the weaknesses underlines the need for more meetings and follow-ups on the activities and, in some cases, the lack of transparency.

Examining the CHWs in CUs, three major features emerge. Firstly, trained CHWs regularly pass their acquired knowledge to children, and less frequently to other categories of people (i.e. neighbors and friends). This result could be driven by the specific sample interviewed (i.e. mainly women taking care of children), but it could be related to the simplest nature of these relationships (i.e. it is natural that mothers transfer the knowledge to their children). In addition, probably children are perceived as the ones that need the most the transfer of this kind of knowledge.

A second feature concerns health and nutrition information network. CUs appear to be extremely cohesive on doubts on health and nutrition and this cohesion is not linked to the borders of the CUs, but goes beyond them: the networks does not present any isolated subgroups of people, but there exists a well-connected group of people interacting within each other.

Thirdly, the CUs network is geographically based: nearer CUs are more connected, while far away CUs are less connected confirming that rural areas suffer from the lack of infrastructures. But interestingly this is not disconnecting the entire network.

The good cohesion detected in the CU/HF leads us to infer that the community-based approach introduced in the Kenyan health system is having positive effect in Migori County among the community of people working in it.

Finally considering IGA groups, we can underline that they are mainly constituted by women, the ones that dedicate time to activities — such as farming – which are normally supported by WeWorld to increase their capacity to access credit.

In the specific case of table banking/SILC, we underline that for this lending and loaning activity women in Africa are considered to be at lower risk of default in their repayments to the group. In particular, in this area this activity is directed to support the school fees payment and primary needs.

Within this framework, the results highlight that meetings devoted to IGA groups purposes and issues enable a more general interaction in economic activities, but these are occasions to discuss on other issues as well. If discussing on economic activities is to be considered implicit in the nature of table banking/SILC groups, it is worth noting that health and nutrition issues represent objects of frequent discussions, even if the WeWorld project on the nutrition issues started only a couple of years ago. These results show that IGA groups constitute a good opportunity and forum to exchange information on other topics of interest for the members and allow the information to be spread within the overall Community.
Some mention deserves the pilot study on Schools, even if not representative of the schools in Migori County. Anyway, from these results we trace possible suggestions for future investigations and interventions in the area of educational system.

Even if a small number of people were interviewed, the lack of connections between BoM and HT is quite clear and self-evident. Hence interventions in order to foster these links should be implemented.

Looking at strengths and weaknesses, immediately it appears that general improvements are observed. Some strengths in the word clouds refer to teachers, pupils, but also to schools’ related items (e.g. toilets, sanitation, classrooms, facilities). Several terms refer to enhanced coordination, training, management. Among the weaknesses, the main one is related to funds. The interviewed persons suggest that the lack, the delay, the inadequateness of funds constitute the major weakness of nowadays interactions.

In conclusion, the use of SNA in this context constitutes a novelty that enabled to investigate health and nutrition projects according to relational perspective of different actors in Migori County.

This perspective is highlighting relational strengths and weaknesses that without a SNA perspective will not be emphasized. It allows institutional and CSOs actors to conceive strategies to improve their final results and impacts and to implement further and more tailored made actions useful for the County.