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Time volunteered on community health activities by *brigadistas* in Nicaragua

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ABSTRACT

Objective. *To report on how* brigadistas *("health brigadiers") in Nicaragua volunteer their time before the introduction of expanded responsibilities (beyond the scope of integrated community case management (iCCM)) for sick children 2–59 months old.*

Methods. *Three complete teams of* brigadistas (n = *12* brigadistas *total) were selected from remote communities in the department of Matagalpa. Each respondent* brigadista *was interviewed privately regarding the frequency and duration (i.e., preparation, round-trip travel, and implementation time) of 13 separate activities. The correlation between their overall estimates and summed times of individual activities were measured.*

Results. Brigadista *mean density was 1 per 156 total population (range: 120–217). Each team had one* encargado/a *("manager") with an iCCM drug box plus two to four* asistentes *("assistants"). All resided in the community they served. Eight reported competing time demands during one to nine months of the year.* Brigadistas *volunteered an average of 75 hours per month (range: 35–131).* Encargados *were busier than* asistentes *(98 versus 68 hours per month). Three activities accounted for 70% of their time: 1) iCCM (30%: treatment (11%), follow-up (19%)); 2) receiving training (21%); and 3) promoting birth planning (19%).* Brigadistas' *time was divided among preparation (12%), travel (27%), and implementation (61%). Overall estimates were highly correlated (+0.70) with summed implementation time.*

Conclusions. Brigadistas *from these remote Nicaraguan communities were busy with different activities, levels of effort, and patterns of task-sharing. These findings, plus an ongoing job satisfaction survey and a follow-on time study after the introduction of the new interventions, will inform policy for this valuable volunteer cadre.*

Key words Primary health care; health resources; Nicaragua.

Nicaragua, the second-poorest country in the Americas, has achieved a 4.5% reduction per year in the mortality rate for children under 5 years old, from 66 to 24 deaths per 1 000 live births in 1990 and 2012 respectively (1). However, subnational disparities in child mortality persist among the rural poor, who experience geographic, social, and economic barriers to health care (2). The 2006–2007 Nicaraguan Demographic and Health Survey (*Encuesta Nicaragüense de Demografía y Salud*, ENDESA) revealed that infant mortality among the poorest quintile (residing mainly in rural areas) was 35 per 1 000 live births versus 19 per 1 000 live births among the wealthiest quintile (3). Similar inequity in care-seeking for suspected pneumonia and treatment of diarrhea in children under 5 years of age was also revealed (3). Comparing the poorest to the wealthiest quintiles, more than one-quarter (28% versus 6%) of children under 5 with suspected pneumonia did not seek appropriate care, and almost half (47% versus 36.5%) of children under 5 who suffered an episode of diarrhea did not receive oral

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rehydration (ORS) (3). The World Health Organization (WHO) reported pneumonia and diarrhea on the list of major causes of death among children under 5 years of age in Nicaragua (4). Deaths from these diseases are preventable if families can reach and use services that deliver high-impact interventions. This study sought to further understand community-based methods of providing such care, specifically through a time–motion analysis of the activities of volunteer community health workers in rural regions of the country.

The Nicaraguan Ministry of Health (*Ministerio de Salud*, MINSA) has grouped rural communities into three categories according to geographic access to a health facility: "A" (< 1 hour from a facility); "B" (1–2 hours away); and "C" (> 2 hours away). Category C comprises approximately one-third (30%) of Nicaraguan rural communities, where distance, seasonal road impassibility, lack of public transport, and cost can result in a lack of or delay in treatment leading to advanced disease or even death (5, 6).

In 1981, as part of a strategy for strengthening and enhancing community participation in health, MINSA began training a type of community health worker (CHW) known as health brigadiers or *brigadistas de salud* (7). Although *brigadistas* are unpaid volunteers, they are formally recognized by the health system, with support and supervision from MINSA. Each community has an average of four *brigadistas* (up to eight in very large communities) who task-share to implement the National Community Program for Health and Nutrition (*Programa Comunitario de Salud y Nutrición*, PROCOSAN) for implementing the program's four strategic activities: growth monitoring, birth planning, family planning, and integrated community case management. Each *brigadista* team has one *encargado/a* ("manager") who maintains the drug box and medical supplies, and several *asistentes* ("assistants") who support the *encargado/a* in ancillary tasks. Some *brigadistas* provide more technically advanced services, including treatment for malaria and tuberculosis and/or distribution of contraceptives, including injectables.

Integrated community case management (iCCM) is a pro-equity strategy by which *brigadistas* deliver life-saving curative health interventions for common childhood illnesses in communities that lack access to facility-based services (8). MINSA tested the iCCM strategy for sick children from 2 months to 5 years old, in 2006, adopted the lessons learned from the qualitative analysis, which highlighted the importance of supporting routine monitoring and documentation of strategic operational policy and management issues vital for iCCM success (9, 10), and mandated it as national policy for category C communities in 2012.

Current trends in task-shifting and integrated program delivery require CHWs to deliver several essential services, including maternal and child health, family planning, HIV/AIDS, malaria, and environmental health, thereby increasing their responsibilities (11). However, a literature review on CHWs cautions that "despite the wide range of tasks that CHWs can do, they cannot do everything—their limited educational background and training mean that they can only be expected to perform a limited number of tasks that complement the work of health professionals" (12). Indeed, a qualitative study of Pakistan's Lady Health Workers revealed that added responsibilities (i.e., those not in their initial job descriptions) took a substantial amount of time away from their regular work (13).

A literature search yielded a few published time–motion studies on community- and facility-based health workers in Africa. These included studies on 1) health extension workers (HEWs) in Ethiopia (14); 2) a registered nurse, assistant nurse, nurse aide, and community assistant in primary health centers in Cameroon (15); and 3) clinicians in outpatient HIV clinics in Uganda (16). However, none of the studies examined volunteers. No time–motion studies of Latin American CHWs of any type were found, highlighting the need for further understanding of CHW tasks and time allocation in the region.

Save the Children (SC) (Managua, Nicaragua) had supported MINSA in the delivery of iCCM in the Nicaraguan department of León since 2006, and in the departments of Matagalpa and Jinotega since late 2008 (9, 10). In 2014, SC Nicaragua and MINSA approved a plan to expand the scope of iCCM to provide 1) routine postnatal care for children < 2 months old, 2) care for newborns (< 28 days) with signs of possible severe bacterial or localized bacterial infection, and 3) care for sick infants 28–59 days old. SC estimated that the *brigadista* teams would have to spend an additional 100–200 hours per community per year to provide the routine postnatal care, plus additional time to care for and follow up 15–30 expected cases per year of newborns or young infants with signs of illness. Expanding *brigadistas'* duties could threaten their thus-far remarkable motivation. The purpose of this study was to report on how *brigadistas* in Nicaragua volunteer their time before the introduction of expanded responsibilities (beyond the scope of iCCM) for sick children 2–59 months old.

MATERIALS AND METHODS

Design and setting

The research team interviewed *brigadistas* from communities in the municipality of La Dalia in the department of Matagalpa between 26 March and 10 April 2014. Three communities accessible to the central town (i.e., round-trip plus several interviews feasible during daylight) were selected from a list of five randomly selected category C communities.

Access to these communities was challenging due to steep hills and rough roads. Local transportation consisted of a daily bus within walking distance—often 30 minutes or more—that might be cut off during the rainy season. Most economic activity was subsistence or migrant agriculture, with an occasional *pulpería* selling prepackaged snack foods, juices, and coffee. Families resided in small one- to two-room wooden homes with tin roofing, surrounded by tropical foliage.

Subjects

The research team sought and selected *brigadista teams* based on the following criteria: 1) size of team and sex, age, and years of schooling of *brigadista* team members broadly representative of the national experience[5]; 2) already delivering iCCM for children 2–59 months of age; 3) targeted for training in postnatal care and iCCM for newborns and young infants; and 4) has *brigadista* team members who will be delivering the additional care (beyond iCCM) slated for the

[5] The national norm for *brigadistas* is shown in Table 1.

program (routine postnatal care plus care and follow-up for sick newborns and young infants).

Variables

The first step entailed gathering the subjects' identifying information, including months per year of community residency and months per year with competing time demands, among other data. Next, the frequency and duration of each of 13 *brigadista* activities (specified by SC's Health Program in consultation with technicians and *brigadistas*) as well as and their overall estimate of total volunteer time (hours per month) were explored. "Duration" included time for preparation, round-trip travel, and actual implementation.

Data collection and analytic approach

A pretested, two-page questionnaire was used to interview all *brigadistas* individually, either at a local training facility or in their communities. A preprogrammed MS Excel® worksheet (Microsoft, Redmond, Washington, United States) was used to convert all reported frequency and duration values to hours per month. All entered data were visually rechecked. If a range was given for a value, the average was used. Frequency tables were reviewed and 10 outliers were identified (out of 432 entries (12 subjects x 12 activities x 3 time types—preparation, implementation, and travel)). Eight outliers were resolved by reinterviewing two subjects; the remaining two were resolved by substituting average values for the variable within their *brigadista* type (*encargado/a* versus *asistente*).

The sample and overall findings for total time for each activity (i.e., preparation + travel + implementation) were described. Findings were stratified by type of *brigadista* (*encargado* or *asistente*), sex, team (community X, Y, or Z), or time type, and results were presented as means and ranges. The small sample size precluded more detailed stratification (e.g., by both *brigadista* type and sex).

New variables were created by combining existing variables. For example, "growth monitoring" included weighing children at community health events and visiting non-attendees; "service delivery" included delivery of iCCM treatment and follow-up of sick children, promoting birth planning, delivering family planning, giving health talks; "administrative activities" included supporting the annual census, recording data, attending meetings, and attending the annual evaluation; "community activities" included weighing children, giving health talks, and attending meetings; and "individual activities" included all service delivery components except weighing children (which is a community-level activity).

Team-level analyses were standardized for a total population of 1 000 to allow for comparisons. The correlation between *brigadistas'* self-reported overall total effort and the sum of time spent on each of their reported 39 components (13 activities, each with three time types) was measured using MS Excel®.

A sensitivity analysis was performed by recalculating total volunteer time, assuming that any month with competing time demands precluded any *brigadista* work, thereby estimating a minimum level of effort. Statistical inference was not used, given the small sample size.

Informed verbal consent was obtained from each study respondent. The interviewer read a prepared statement to each consenting *brigadista* explaining the purpose of the study, the confidentiality of responses, and the option to decline to answer any or all questions at any time. Once the interview was completed, the interviewer immediately reviewed the data (on-site) to address obvious discrepancies or gaps. Additional data were collected for program support. As this research focused on the implementation aspect of a preexisting program, no formal approval was sought from an ethics committee. Approval for the study was obtained from MINSA.

RESULTS

Sample

A total of 12 *brigadistas*, comprising three teams from three communities (X, Y, and Z) in the municipality of La Dalia in the department of Matagalpa, were interviewed (Table 1). Each team consisted of one *encargado/a*, who carried the drug box, plus two to four *asistentes*. The ratio of *brigadistas* to the general population was 1 to 156 (range: 120–217). The communities were remote, consistent with category C status (mean distance from the nearest health facility: 11.4 km (range: 7–19) or 2.3 hours (range: 1.75–4)).

Brigadistas in this sample were more likely to be female than male (8 versus 4) and had widely ranging ages (mean: 34.3 years; range: 16–59 years) and retention periods (mean: 9.2 years; range: 2 months to 31 years). Three had volunteered for less than one year. *Brigadistas*' years of schooling varied widely (mean: 8.6; range: 0–13) and was associated with age (10.3 for those ≤ 45 years old versus 5.3 for those > 45 years old). *Encargados* had a bit more schooling than *asistentes* (9.7 versus 8.2 years). All *brigadistas* resided in the community that they served, but eight reported competing time demands (e.g., for farming or school) during 1–9 months of the year (mean: 2.7 months for all 12 *brigadistas*).

Two teams had mother–daughter pairs. One was from community "X" (ID codes "X1" and "X2") and consisted of an *encargada* supported by, among others, her recently trained 16-year-old daughter. The second one was from community "Y" (ID codes "Y3" and "Y4") and consisted of an *asistente*, a non-literate midwife, supported by her recently trained 21-year-old daughter. Before the researchers analyzed and summed time spent by the *brigadistas* on each individual activity, the *brigadistas* estimated their overall commitment to PROCOSAN activities was, on average, 10.2 hours per week (range: 2–28). All three *encargados* and one of the *asistentes* reported delivering all four PROCOSAN strategies (growth monitoring, birth planning, family planning, and iCCM). Two teams had one *brigadista* who treated sick children; the other had two. All *asistentes* weighed children, and most (8 out of 9) delivered birth planning. About half of the *asistentes* (4 out of 9) provided sick child follow-up. Only *encargados* delivered family planning.

Activities

The *brigadistas* confirmed that the 13 predetermined activities listed by the research team accurately captured their volunteer duties over a typical year. They reported total time spent on all activities averaged 75 hours per month (range: 35–131; Table 2). *Encargados* reported being somewhat busier than *asistentes* (98 versus 68 hours per month respectively). Males and females

TABLE 1. Comparison of national norm for *brigadistas* and profile generated by study of *brigadista* volunteers conducted prior to introduction of new *brigadista* tasks, La Dalia, Matagalpa, Nicaragua, 26 March–10 April 2014

Variable	National norm	*Brigadista* Profile based on study results												Summary
		X1	X2	X3	X4	X5	Y1	Y2	Y3	Y4	Z1	Z2	Z3	
Community	NA[a]			X					Y			Z		
Type	NA	*En*[b]	*As*[c]	*As*	*As*	*As*	*En*	*As*	*As*	*As*	*En*	*As*	*As*	3 *Encargados and 9 Asistentes*
Sex	~ 50% F[d]	F	F	F	F	M[e]	M	M	F	F	F	F	M	8 females, 4 males
Age (years)	16–70	41	16	22	19	46	48	38	55	21	22	25	59	Mean: 34.3 years
Retention (years or months)	15–20 yrs	9 yrs	5 mos	2 mos	3 yrs	5 yrs	23 yrs	4 yrs	2 yrs	4 mos	4 yrs	2 yrs	31yrs	Mean: 9.2 years
Total population covered per *brigadista*	333	120	120	120	120	120	148	200	150	150	200	217	217	Mean: 156 people per *brigadista*
Schooling (years)	4–10	8	10	11	11	8	8	8	0	8	13	13	5	Mean: 8.6 years
Officially resides in community	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	All (100%) were residents of their respective communities
Resides in community (months per year)	9	12	12	12	12	12	12	12	12	12	12	12	12	Mean: 12 months per year
Competing time demands (months per year)	Not known	4	1	4	0	4	7	2	0	0	1	0	9	Mean: 2.7 months per year
Distance to health facility (km)	4–20	14	DK[f]	DK	DK	9	8	7	DK	DK	DK	19		Mean: 11.4 km
Walking distance to facility (hours)	2+	1.75	3	2	2	2	4	2	2	3	2.1	1.75	2	Mean: 2.3 hours

Source: Prepared by the authors based on the study results.

[a] NA: Not applicable.

[b] *En*: *Encargado/a* ("manager"; carries the integrated community case management (iCCM) drug box).

[c] *As*: *Asistente* ("assistant"; does not carry the iCCM drug box).

[d] F: Female.

[e] M: Male.

[f] DK: Respondent did not know.

TABLE 2. Self-reported time spent on various community health activities (hours per month) per *brigadista* and overall (by type and sex), based on study conducted in La Dalia, Matagalpa, Nicaragua, 26 March–10 April 2014

Activity	Reported time spent per *brigadista* (total hours per month)												Reported time spent by *brigadista* type and sex (average hours per month)				
Brigadista ID →	X1	X2	X3	X4	X5	Y1	Y2	Y3	Y4	Z1	Z2	Z3	Total	*En*[a]	*As*[b]	Male	Female
Type →	*En*	*As*	*As*	*As*	*As*	*En*	*As*	*As*	*As*	*En*	*As*	*As*	(*n* = 12)	(*n* = 3)	(*n* = 9)	(*n* = 4)	(*n* = 8)
Sex →	F	F	F	F	M	M	M	F	F	F	F	M					
Receives training	14	15	13	24	17	11	22	10	7	17	22	17	16	14	16	17	15
Promotes birth plan	4	12	27	0	7	4	5	65	29	8	4	8	14	5	17	6	18
Integrated community case management (iCCM)																	
Delivers treatment	22	0	0	0	0	24	0	34	0	16	0	0	8	21	4	6	9
Follows up sick children	13	29	0	0	0	56	12	0	0	13	30	22	15	27	10	22	11
Weighs children	6	6	4	4	6	6	10	8	6	5	6	6	6	6	6	7	5
Visits non-attendees	2	2	0	0	0	7	17	11	14	0	5	5	5	3	6	7	4
Records information	6	2	8	0	0	3	0	0	0	9	13	0	3	6	2	1	5
Delivers family planning	9	0	0	0	0	7	0	0	0	6	0	0	2	7	0	2	2
Gives health talks	1	1	0	0	0	3	0	0	0	9	3	3	2	4	1	2	2
Receives supervision	2	3	1	2	0	2	1	1	3	2	2	0	2	2	1	1	2
Supports census	1	1	0	5	2	0	1	1	0	1	3	2	1	1	2	1	2
Attends community meetings	1	2	1	1	2	1	1	1	1	1	2	0	1	1	1	1	1
Attends annual evaluation	1	1	0	1	1	1	2	2	0	1	1	1	1	1	1	1	1
Total (in hours)	81	73	54	37	35	125	69	131	59	87	90	64	75	98	68	73	76

Source: Prepared by the authors based on the study results.

[a] *En: Encargado/a* ("manager"; carries iCCM drug box).

[b] *As: Asistente* ("assistant"; does not carry iCCM drug box).

reported about the same level of effort (73 versus 76 hours per month respectively). Four activities accounted for more than two-thirds (70%) of their time: receiving training (21%), following up sick children (19%), promoting birth planning (19%), and treating sick children (11%). Thus, iCCM (treatment and follow-up) was the single most time-consuming activity, accounting for an average of 23% of the *brigadistas*' time, with *encargados* spending more time on this activity than *asistentes* (48 out of 98 or 49% versus 14 out of 68 or 21% respectively). All *brigadistas* reported receiving training (7–24 hours per month) with no difference by *brigadista* type or sex. On average, females spent more time promoting birth planning than males (18 out of 76 hours per month or 24% of their total time spent versus 6 out of 73 hours per month or 8% of total time), whereas males spent more time than females on sick child follow-up (22 out of 73 hours per month or 30% of total time spent versus 11 out of 76 hours per month or 15% of total time spent) (Table 2).

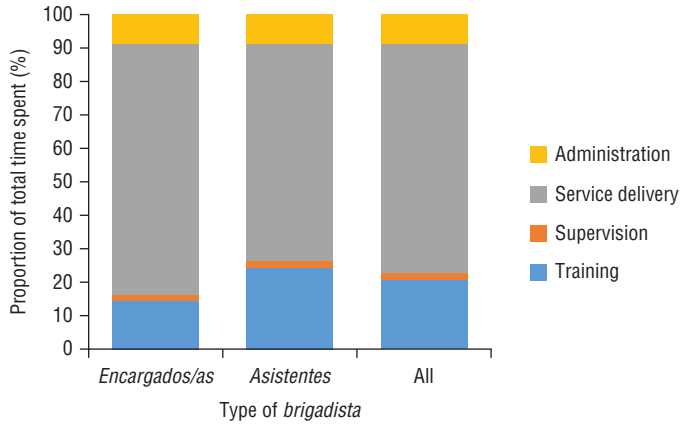
In carrying out the PROCOSAN strategies, *encargados* spent much of their time on iCCM treatment (48 out of 98 hours per month or 49% of total time spent) and family planning (7 out of 98 hours per month or 7% of total time spent), whereas *asistentes* prioritized birth planning (spending 17 out of 68 hours per month or 25% of total time spent), growth monitoring (12 out of 68 hours per month or 18%), and sick child follow-up (10 out of 68 hours per month or 15%). *Asistentes* delivered no family planning. *Brigadistas* spent most of their time in service delivery (75% and 65% of total time spent by *encargados* and *asistentes* respectively) (Figure 1). *Encargados* and *asistentes* spent about one-tenth of their time in community-level activities such as weighing children, giving health talks, and community meetings (Supplementary Material Figure 1).

Brigadistas' time was divided among activity preparation (12%), activity-related travel (27%), and activity implementation (61%), with little difference between *encargados* and *asistentes* (Figure 2). The activities with the greatest preparation time were promoting birth planning (2.8 hours per month) and following up sick children (1.6 hours per month) (data not shown). Activities with the greatest travel time were following up sick children (7.7 hours per month), promoting birth planning (5.7 hours per month), and receiving training (3.5 hours per month) (data not shown).

Teams varied in how they apportioned time for different activities. *Brigadistas* in community Y reported spending more total time for each time type despite having fewer *brigadistas* than community X. The differences remained after standardizing the total population. *Brigadistas* in community Y reported far more time for growth monitoring than communities X or Z (82.8 versus 29.4 and 26.3 hours per month per *brigadista* team respectively). *Brigadistas* in community Z reported more time in following up sick children versus treating them (64.8 versus 16.0 hours per month per team) compared to communities X and Y (41.5 versus 22.0 and 68.0 versus 58.8 hours per month per team respectively). The differences persisted after standardization (data not shown).

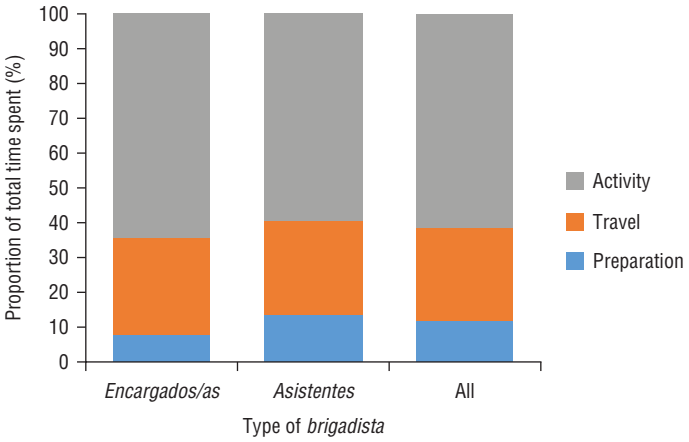
There was moderate agreement between *brigadistas*' estimates of the total number of hours they had volunteered (in response to a single question, with 30 seconds allotted for answering) and the study's summed amounts of time spent

FIGURE 1. Proportion (%) of total time spent on four types of program work, by type of *brigadista* (*encargado* versus *asistente*), based on study conducted in La Dalia, Matagalpa, Nicaragua, 26 March–10 April 2014[a]



Source: Prepared by the authors based on the study results.
[a] Three *encargados* ("managers") and nine *asistentes* ("assistants") worked an average of 98 and 68 hours per month respectively.

FIGURE 2. Proportion (%) of total time spent on activity preparation and implementation, and activity-based travel, by type of *brigadista* (*encargado* versus *asistente*), based on study conducted in La Dalia, Matagalpa, Nicaragua, 26 March–10 April 2014[a]



Source: Prepared by the authors based on the study results.
[a] Three *encargados* ("managers") and nine *asistentes* ("assistants") worked an average of 98 and 68 hours per month respectively.

on all individual activities (based on the *brigadistas*' responses to 39 questions (13 activities, with three different time types each) allotted a total of about 30 minutes for answering (correlation coefficient, +0.56)) (Figure 3). The correlation between the *brigadistas*' overall estimate and the summed time spent for activity implementation (i.e., excluding preparation and activity-related travel time) was stronger (+0.70).

Brigadista volunteer time decreased about 20% (from 75 hours per month (range: 35–131) to 59 hours per month (range: 16–131)) (data not shown) if it is assumed that all *brigadistas* who specified any months during the year with competing time demands would be unable to perform any duties during those months.

DISCUSSION

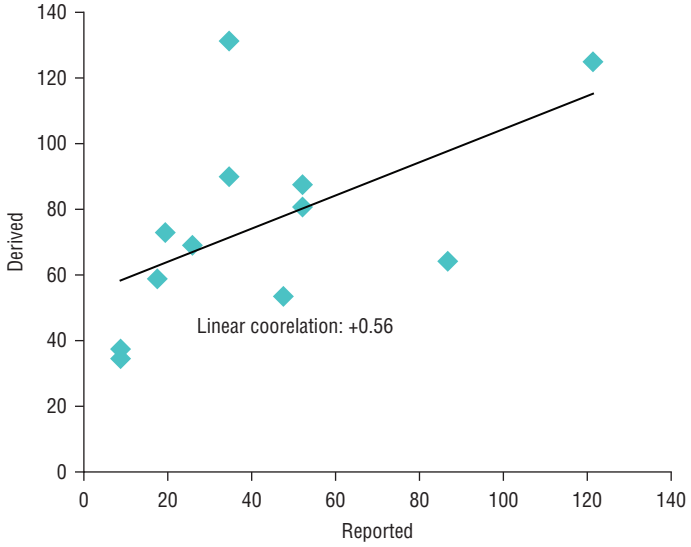
Brigadistas from the category C communities with iCCM were busy, reportedly volunteering 59–75 hours per month (14–17 hours per week). These *brigadistas* and the teams they comprised generally represented national norms in terms of age and sex, years of schooling, place of residence, and distance to the health facility (Dixmer Rivera, personal communication, 2014). *Brigadistas* varied in age, sex, years of schooling, and duration of retention. Four of the 12 were mother–daughter pairs. Intergenerational enlisting within families supports the desirability of the *brigadista* role, which may partly explain retention of 20–30 years or more.

Brigadista teams likewise varied in their distribution of tasks, although some trends emerged. For example, few *brigadistas* provided iCCM treatment, but many followed up sick children; only iCCM providers delivered family planning, whereas growth monitoring and birth planning were more broadly shared. Likewise, levels of *brigadista* effort varied widely—by a factor of nearly 4 (overall). The variation reflects teams' different solutions to providing continuous care in the face of varying team composition, skills, interests, and availability.

In the current study, three activities accounted for more than two-thirds of the reported time: iCCM (delivery and follow-up), receiving training, and birth planning. Following up sick children comprised nearly two-thirds of the total iCCM time, largely due to travel. Nicaragua's iCCM protocol calls for routine follow-up of each sick child, which undoubtedly helps treatment adherence. Other approaches, such as asking the caregiver to travel to meet with the *brigadista*, or conducting follow-up by mobile phone, could decrease the follow-up time, where feasible. However, each of those approaches has drawbacks.

Results reported in this study are consistent with the results from an assessment of Ethiopia's paid HEWs (11) in that both studies reported that 70% of the workers' time was spent on patient/community health activities (with the remaining 30% of their time spent on other program activities). In terms of time spent on specific types of patient/community health activities, the results differed slightly. For example, the HEWs spent 43% of their time on health promotion and prevention, whereas in the current study the *brigadistas* spent 49% of their time on these types of activities (following up sick children (19%), promoting birth planning (19%), and treating sick children (11%)). In addition, as reported in an editorial from Ethiopia (12), the HEWs spent a total of 193 hours per month on their community health activities, versus a total of 75 hours for the

FIGURE 3. Correlation between *brigadistas'* estimate of total time volunteered and total (summed) time spent on individual activities, based on study conducted in La Dalia, Matagalpa, Nicaragua, 26 March–10 April 2014



Source: Prepared by the authors based on the study results.

brigadistas' studied in this research; however, the former—unlike *brigadistas*—were salaried.

Limitations

The main limitation in the current study was small sample size due to resource constraints. Moreover, some generalizability was sacrificed because the authors wanted to study *brigadistas* as both individuals and teams. A second limitation was the reliance on self-report, which is liable to recall or reporting bias. A study in Ecuador that compared four different methods for time analysis found that health workers completing self-administered timesheets underestimated the amount of time spent on nonproductive activities compared to independent observation (13). A third potential limitation could be bias due to the research being funded, implemented, and documented by the same institution; however, the authors do not see any conflicts.

In addition, the validity of time studies is challenging, regardless of method. Direct observation is costly and also prone to bias. Requesting subjects to record activities according to a preprogrammed "beep" (e.g., every 15 minutes) is intrusive, requires perhaps unrealistic adherence, and does not guarantee truthful responses. Equipping *brigadistas* with smartphones with geographic information system (GIS) capability to gather data on time spent traveling for work might allow partial validation, but ethical issues and eliminating travel unrelated to work would be a challenge. Nonetheless, an earlier application of this method in Ethiopia among full-time, paid HEWs revealed that the sums of their reported individual activities were remarkably close to full-time levels of effort—something the respondents most likely would not be able to fabricate given the level of detail in the questions that they answered (12). This supports the validity of the method used in this study.

The moderate agreement between the *brigadistas'* overall estimate and the derived estimate lends some face validity for the method, but which result is closer to the truth? Most *brigadistas'* overall estimates were less than the derived, summed estimate, perhaps because they did not consider preparation and travel time. Indeed, the correlation between overall report and summed implementation of activities was strongly positive. In short, the method used in this study is affordable for a modest sample and compares well with alternative approaches.

Conclusions

Nicaragua benefits from a committed cadre of active, non-salaried community health workers, whose work is acknowledged by both the Nicaraguan government and other policy-makers in the country. The results collected in this study are a baseline assessment against which to compare time allocation after the introduction of an expanded package of interventions, and therefore will have critical value to the upcoming changes in the *brigadista* workload. Even within this small sample, time allocations for similar activities were varied across the teams, suggesting that inter-team sharing might lead to more efficiency. Upon revealing the results from this study, and seeing that these volunteers are already working an average of 75 hours per month (range: 35–131), the authors suggest streamlining the roles and responsibilities of *brigadistas* before introducing any added service component. The provision of ongoing refresher training sessions for *brigadistas* is also recommended, to build efficiency into their work, along with further in-depth analysis of the reasons behind this remarkable volunteerism, to yield clues generalizable to other settings.

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Conflict of interests. None.

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RESUMEN

Tiempo de trabajo voluntario dedicado a actividades relacionadas con la salud en la comunidad de los brigadistas en Nicaragua

Objetivo. Informar sobre el trabajo voluntario de los brigadistas en Nicaragua antes de la ampliación de sus responsabilidades (más allá del manejo de casos a nivel comunitario) para que se ocuparan también de los niños enfermos de 2 a 59 meses.

Métodos. Se seleccionaron tres equipos completos de brigadistas (n = 12 brigadistas en total) de comunidades remotas del departamento de Matagalpa.

Cada brigadista fue entrevistado en privado sobre la frecuencia y la duración (es decir, preparación, viaje de ida y vuelta, y tiempo de ejecución) de 13 actividades diferentes. Se midió la correlación entre sus cálculos generales y la suma de los tiempos de las actividades individuales.

Resultados. La densidad promedio de brigadistas era de 1 por 156 habitantes (intervalo: 120-200). Cada equipo tenía un encargado con una caja de medicamentos para el manejo de casos comunitario y de dos a cuatro asistentes. Todos residían en la comunidad que atendían. Ocho informaron exigencias de tiempo conflictivas de uno a nueve meses al año. Los brigadistas trabajaban como voluntarios un promedio de 75 horas por mes (intervalo: 35-131). Los encargados estaban más ocupados que los asistentes (98 horas frente a 68 horas por mes). Tres actividades insumían el 70% de su tiempo: 1) manejo de casos a nivel comunitario (30%: tratamiento [11%], seguimiento [19]); 2) participación en actividades de capacitación (21%), y 3) promoción de la planificación del nacimiento (19%). El tiempo de los brigadistas se repartía entre la preparación (12%), el viaje (27%) y la ejecución (61%). Se observó una elevada correlación (+0,70) entre los cálculos generales y la suma de los tiempos de ejecución.

Conclusiones. Los brigadistas de estas comunidades remotas nicaragüenses realizaban distintas actividades, con niveles de esfuerzo y esquemas de división de tareas diferentes. Estos resultados, además de una encuesta en curso sobre la satisfacción en el trabajo y un estudio de seguimiento de los tiempos después de la introducción de las nuevas intervenciones, servirán para fundamentar las políticas en relación con este valioso equipo de voluntarios.

Palabras clave Atención primaria de salud; recursos en salud; Nicaragua.