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To cite this article: Merrilyn Walton , Dian Sidik Arsyad , Sarina Alimuddin , Andi Imam Arundhana , David Guest , Peter McMahon , Rauf Doel & Sudirman Nasir (2020): Implementing a One Health village volunteer programme in West Sulawesi, Indonesia: A pilot study, Global Public Health, DOI: [10.1080/17441692.2020.1836247](https://doi.org/10.1080/17441692.2020.1836247)

To link to this article: <https://doi.org/10.1080/17441692.2020.1836247>



Published online: 22 Oct 2020.



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REPORT



Implementing a One Health village volunteer programme in West Sulawesi, Indonesia: A pilot study

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ABSTRACT

A pilot village volunteer programme (VVP) was implemented to produce new knowledge about the extent to which 24 trained village volunteers, taking an integrated One Health approach, could assist their communities by disseminating information on better agricultural and health practices. Just prior to the six-month pilot, the volunteers were mentored in a four-day training programme by local agricultural extension and public health experts. On returning to their villages, contacts and activities by volunteers with local community members were monitored using a CommCare application, enabling uploaded data to be accessed in real-time. The six volunteers in each village coordinated activities to address concerns of households. The VVP resulted in 960 actions (356 agricultural; 604 health), helping in 97% of contacts, most (55-61%) by providing information and others by advising community members where appropriate information could be sourced. Focus group meetings with village leaders, community health staff and local extension officers supported continuation of the VVP through local funding. Six months after the pilot, volunteers were continuing their activities and assisting with other government measures, such as district programmes to reduce childhood stunting and improve waste disposal. Community empowerment using local human resources is sustainable and could be supportive in government programmes.

ARTICLE HISTORY

Received 22 April 2020
Accepted 28 September 2020

KEYWORDS

Volunteers; health; cocoa; prevention; empowerment; One Health; Indonesia

Introduction

Since the adoption of the 17 Sustainable Development Goals (SDGs) by the United Nations General Assembly in 2015 there has been limited progress for rural farming communities in low- and middle-income countries who continue to live in extreme poverty (United Nations, 2018). This is particularly the case in rural farming communities in Indonesia (World Bank, 27 June, 2019). In 2017 a cross-sectional livelihood survey was administered to 509 respondents in four cocoa farming villages in the District of Polewali-Mandar, West Sulawesi Province, Indonesia (Arsyad et al., 2019). The survey results revealed significant numbers of people with unprotected water sources, poor sanitation, significant stunting, poor nutrition and untreated symptoms of various diseases. Agricultural problems included price fluctuations in an unstable market, limited access to capital,

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and low cocoa production (275 kg/annum per household). Most households had no bank accounts (69%).

Our research also identified other factors that may contribute to impoverished villages such as a lack of understanding by communities of the underpinning knowledge related to diseases e.g. germs related to communicable diseases and particular lifestyle related non-communicable diseases as well as the role behaviours play in poor health outcomes such as infections, stunting, chronic ill health or poor agricultural outcomes e.g. poor harvests. In summary, the multidimensional results showed cocoa farming communities faced significant challenges in many spheres of their lives including land management, agricultural practices, finances, nutrition, human health, animal health and demographic changes (Arsyad et al., 2019).

Poverty in these regions is multidimensional. Knowing the role of unsafe water in childhood illnesses is important information for the family as is the role of protective measures such as hand washing in preventing transmission of infections. It is noteworthy that many rural cocoa farming communities do not attend secondary school and have received little education about activities that can enhance the health of humans, plants and animals. To address this gap in knowledge about the interconnectedness of human health, agriculture, plant health and animals we designed and implemented a village volunteer programme for four villages in the District of Polewali Mandar in West Sulawesi. This article reports on the six-month pilot study of the Village Volunteer Programme (VVP) which ended in September 2019, but the volunteer programme continues at the time of writing.

One Health approach

Employing an integrative approach of One Health, (Hill-Cawthorne, 2019; Thumbi et al., 2015) the pilot village volunteer programme (VVP) was implemented to produce new knowledge about the extent to which villages, when provided with coaching and mentoring by trained volunteers, can minimise the occurrence of disease in both humans and crops, thus improving their livelihoods through better health and increased productivity. The livelihood curriculum underpinning the VVP used the evidence gained from a livelihood survey administered to the four villages in the District of Polewali Mandar, West Sulawesi, and reported in another publication (Arsyad et al., 2019). The same four villages who participated in the livelihood survey (Duampanua, Kelapa Dua, Landikanusuang and Sattoko) also participated in this pilot. The survey identified areas in health and agriculture that with appropriate interventions, have the potential to improve livelihoods (Arsyad et al., 2019).

Community empowerment in Indonesia

Community development programmes in Indonesia are promoted nationally through the National Community Empowerment Programme (Asia Development Bank, 2016). Implementation of Village Law (Law 6/2014) allows villages to plan and budget for local initiatives to improve livelihoods and has expanded their reach. This law aims to reduce poverty at the village level by providing villages with autonomy to frame development and includes additional funds to support their initiatives (Institute for Health Metrics, 2010).

Such initiatives include bringing health services closer to the communities they serve. Four levels of health service are organised and include the *Puskesmas* (community health centre), the *Posyandu* (community integrated health outreach), the *Polindes* (village midwife clinic) and the *Pustu* (the extension of *Puskesmas*). The primary focus of these health services is maternal and child health and enhancing people's capability for preventative measures related to communicable and more lately to non-communicable diseases. Community health volunteers exist under the Government empowerment scheme and are known locally as *Kader*. *Kaders* work with the midwives and focus on assisting villages in the areas of maternal and child health, immunizations, family planning, nutrition.

Kaders are non-salaried though they receive small amounts of financial and non-financial incentives from the village government. During the consultations with the stakeholders it was noted that *Kaders* have little training but usually assist the government-employed village midwife during monthly evaluations of pregnancy and infant development, as well as vaccinations. The limited training received by *Kaders* has been reported in several studies in Indonesia (Nasir et al., 2016; Tumbelaka et al., 2018). The village volunteer pilot programme reported here supplemented the work currently being managed by these centres.

A priority of the Government in West Sulawesi is to rejuvenate farms with clonal cocoa. The government distributes seedlings of cocoa varieties that have proved to have promising productivity and resistance to pests and diseases. These include MCC01 and MCC02, both officially released by the Indonesian Coffee and Cocoa Research Institute (ICCRI) and Ministry of Agriculture. Training on grafting of the clonal material (top-grafting in nurseries and side-grafting on mature trees) is provided by the District and Provincial extension services. Farmers need to be trained on layout, pre-treatment of planting holes, and shade tree management. In addition, training of farmers in local farmer groups, school groups (high school agricultural students) and extension services is provided in villages or at district locations such as Saung Kakao, a training centre on a demonstration farm in Polewali-Mandar District, West Sulawesi. Extension officers liaise with farmer cooperatives involved in monitoring cocoa quality according to standards set by the buyers (mainly Mars Inc. and Nestle).

Background to volunteer programmes

While the use of volunteers to provide advice and support to villages is not new, the evidence for their effectiveness is light (de Vries & Pool, 2017). One of the major challenges is sustainability after volunteers have been trained, compounded by high attrition rates. The literature suggests a number of contextual issues influences success or failure such as the type of community, economics, environment and health system policy and socio-cultural factors such as gender norms and values relating to diseases and stigma as well as health systems support for such initiatives (Kok et al., 2015). This pilot study addressed these challenges by building into the study method steps to address sustainability, engagement with the broader government networks and volunteer knowledge.

A major barrier to improved livelihoods of rural communities in low resource countries is the lack of access to quality health care, education and sustainable incomes. Communicable diseases such as lung tuberculosis and diarrhoeal diseases persist as major causes of disability and death in rural areas in Indonesia, although there is also a sharp increase of non-communicable diseases e.g. diabetes mellitus and cardiovascular diseases (Institute for Health Metrics, 2010; Ministry of Health, 2018). While better access to health treatment is a major concern for funded health services there are many low-cost preventative activities that individuals and villages can do to improve their own health care and limit the potential for outbreaks of diseases.

Similarly, improving farm practices begins with the smallholders themselves. If individuals and families were provided with information and skills about how they can improve their quality of life through changing behaviours, their health and general livelihood would be enhanced significantly. However, comprehensive information about how to prevent disease and improve health care, as well as improve farming practices, is often not available. Village volunteer programmes routinely focus on specific areas such as maternal and child health, or on a particular disease such as malaria eradication. Broader approaches e.g. health prevention, promotion and sanitation are normally left to government staff to manage. However, success in these areas is dependent on a community's appreciation of health burdens, knowledge about what they can do to improve livelihoods. Changing behaviours and minds requires instruction in real time and place.

Significant health care improvements have been made over the last three decades from scientific discoveries and we can now treat previously untreatable diseases. One of the unintended

consequences of these scientific discoveries is the focus on acute care and the significant role of hospitals in healthcare. Today modern health systems spend more health dollars on managing symptoms of diseases rather than on prevention. Associated with this are the dangers caused by over-treatment and the complexity of healthcare. In addition, many health professionals are trained in hospital environments remote from village life. This pilot programme hypothesises that significant health benefits can be experienced when individuals understand the causes of poor health and how they can, by changing behaviours, minimise or avoid contacting diseases.

Method

This project had ethics approval from the University of Sydney (Project number: 2017/242) and Hasanuddin University, Makassar, Sulawesi (Project number 2017/47). The pilot programme involved four stages: (1) Developing the curriculum for the volunteer programme, (2) building capacity of instructors on teaching the curriculum to volunteers, (3) intensive training for the volunteers and (4) mentoring and monitoring the volunteers. [Figure 1](#) summarises the steps in developing and conducting the village volunteer programme. Extensive consultation with stakeholders occurred at every stage to ensure engagement with the local community and government services as well as the need to avoid duplication.

Developing the curriculum for the volunteer programme

The curriculum topics were informed from the survey results that identified major health and agricultural problems in the vulnerable Indonesian region of Polewali-Mandar in West Sulawesi. The curriculum has three parts, a guide to the village volunteer programme, health categories and topics and agriculture categories and topics ([Figure 2](#)).

The Village Livelihood programme provides village volunteers with underpinning knowledge about disease, skills for minimising disease and improving human health and agricultural productivity. Consent forms were approved by the Ethics Committees. The consent form for the training explained the programme and that participation was entirely voluntary. Consent was signed by each volunteer prior to training commencing. Consent forms were filed and kept at the Hasanuddin University Faculty of Public Health. Volunteers were provided with the science underpinning plant

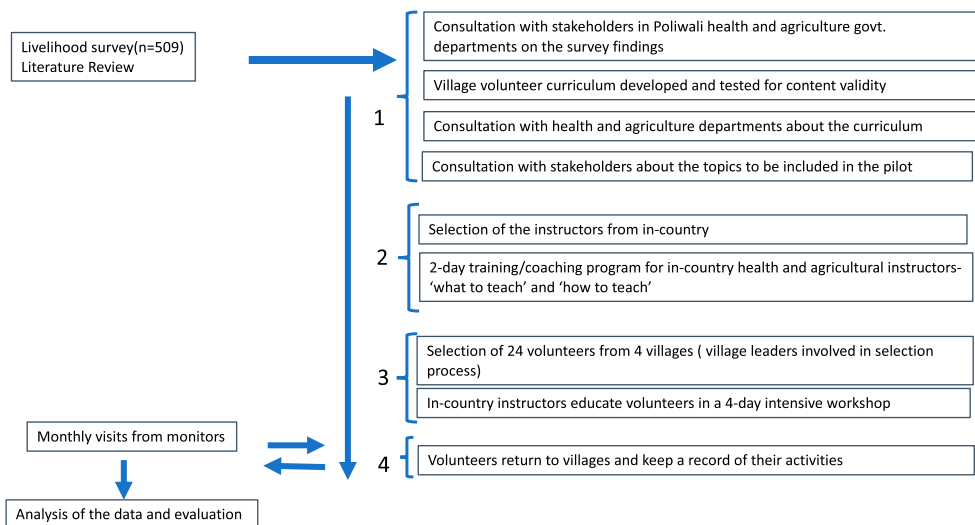


Figure 1. Steps to develop and implement the village volunteer programme.

PART A: GUIDE TO THE VILLAGE VOLUNTEER PROGRAM
 Structure of the program (Underpinning knowledge/action)
 Principles of community empowerment
 How the topics were selected
 Managing power imbalances
 How to implement the program
 Guidelines on disease outbreaks
 Principles underpinning the village volunteer program
 Resolving conflicts
 Resources to assist village volunteers

Category	Topic	Category	Topic
Preventive health care	Hand hygiene Immunisation Safe drinking water Safe garbage disposal Control of disease vectors Early recognition of childhood illnesses	GAP and cocoa planting material	Good agricultural practice and family involvement Seedlings and genotypes Nurseries and improved planting material Farmer testing Shade and its role Planting cocoa
		Planting cocoa and shade trees	Pruning cocoa trees Know to control weeds Shade and land management Maintain good drainage
Infectious diseases	Main vectors and diseases they transmit Control of disease vectors Detection and control of specific diseases. (malaria, dengue, Zika, TB, viral hepatitis, sexually transmitted illnesses).	Tree management	Pests and diseases Control of pests/diseases Applying IPDM principles Soil nutrients and soil amendment
		Pests and diseases of cocoa	Recycling farm waste and composting
Medications and minimise the use of antibiotics	Adherence to medications Appropriate use of antibiotics	Soil nutrition	Forms of diversification Other crops and vegetables on the farm Mixed farming Goats
Nutrition	Under nutrition Over nutrition Maternal and child health	Diversification on the farm	Harvesting and drying beans Fermentation Cocoa farm and markets Farmer cooperatives and sustainability programs Sustainability
Preventing stunting in children	Preventing stunting in children	Post-harvest practices	Cocoa supply chain Nursery enterprise Household finance Savings and access to capital
Antenatal and postnatal care	Role of antenatal and post-natal care in the prevention of stunting	Satellite businesses associated with cocoa	
Eye health	Understand vision problems Prevention and treatment of vision problems	Financial management and accessing capital	
Family planning	Education Different types of contraception		
Health promotion	Lifestyle improvement, physical fitness, stress control Smoking cessation Diet Dental care.		

Figure 2. Outline of the curriculum for the volunteer programme.

diseases as well as human health that can be shared with their communities, thus empowering them to make decisions to improve their livelihoods at both the village and family unit level. This curriculum enables volunteers to both learn about disease and present information in a meaningful way to people with low education and health literacy. Volunteers are asked to model the behaviours such as hand washing, garbage disposal, removing pod husks to prevent the spread of cocoa diseases. They are also required to work closely with existing government services but in a way that maintains confidentiality of family health information. The Departments of Health and Agriculture reviewed the topics and prioritised the topics for the pilot study.

Building capacity of instructors

Eight instructors for the Village Volunteer Programme were selected from the Faculty of Public Health, Hasanuddin University and Swisscontact, a Swiss non-profit-organisation with a focus on reducing poverty. Selected instructors attended a 2-day workshop on the topics plus an additional day to prepare their topics. As this was a pilot it was not feasible to include the whole curriculum, therefore in consultation with the stakeholders, nine topics were selected from the curriculum; five from agriculture (planting cocoa and shade trees, tree management, pests and diseases of cocoa, diversification on the farm and farmer co-operatives) and four from health (preventive health care, infectious diseases, nutrition literacy and preventing stunting in children).

Instructors were provided information about the project; the topics being addressed and how to teach the topics to the volunteers. Lessons were prepared which were then discussed with members of the study team (MW, SN, PM). Just prior to the volunteer training the instructors presented their topics to the research team. After feedback, instructors amended or changed their sessions and sent the proposed session to two members of the research team for review (MW, PM). Training was evaluated with instructors responding to 23 questions using a 5-point Likert Scale [5 = strongly agree, 4 = agree, 3 = undecided, 2 = disagree, 1 = strongly disagree]. Questions covered preparedness, the quality of the content of the training, the challenges, the teaching methods, improvements to the programme. Instructors were paid for training, preparation of materials for their sessions and for teaching in the 4-day volunteer programme.

Intensive training for the volunteers

A total of 24 volunteers were selected from 4 villages to undertake an intensive 4-day training programme in March 2019 to become a volunteer with an equal number of health and agriculture volunteers. In each village, prospective health and agriculture volunteers were interviewed by a panel including the village leader, District government health staff and agricultural extension officers. Three health and three agricultural volunteers were selected in each village. While villages specified the areas (health or agriculture) for the volunteers to focus on, all volunteers received training in both health and agriculture topics. Each village was allocated six volunteers to enable the volunteers to form a supportive group and work as a team, as well as manage times when a volunteer may be absent from the village. This was the reasoning behind training all the volunteers in both health and agriculture topics. Volunteers were asked to make a 12-month commitment to the project. They were also asked to wear the volunteer T-shirt provided to them when they were in their volunteer role. A small amount of money was paid to each volunteer to cover petrol for motorbike use, and other incidentals. *Kaders* are paid a small amount of money by the village, so this programme wanted to mirror that programme so that when the research finished there was a system to take over the VVP. Village leaders advised that if the programme was successful, they intended to maintain the volunteers and budget for it in their annual budgets.

Monitoring and coaching the volunteers during the pilot

The pilot was operational between April and September 2019. Volunteers were asked to complete an activity report after each contact recording their activities on a CommCare, a digital platform downloaded onto their mobile smartphone, enabling data to be uploaded to a central website accessible to the advisers and the research team. After each contact in their role as a volunteer they completed a check list of activities using their mobiles which allowed a record of activities to be downloaded in real time enabling the team to monitor activities and identify problems in a timely way. Each month the same health advisor and an agricultural adviser (members of the research/trainer team) visited the villages to meet with the volunteers to offer support and guidance as well as meet with village leaders. The monthly meetings were a time for the volunteers to debrief and raise concerns or issues and have them resolved during the visit. The two advisers submitted monthly reports after each visit summarising the issues raised and progress being made. The monthly reports submitted to the research team comprised the range of activities recorded on the mobile phones in CommCare as well as the advisers' written reports of their visits. It also provided data about the type of work the volunteers were undertaking. Volunteers were also free to contact the advisers on their mobiles in between monthly visits. Volunteers were free to determine when they would work in their volunteer role but were expected to be in their volunteer role at least once a week. Volunteers were encouraged to work as a team and have regular meetings with each other as well as with the village leadership. All volunteers received a copy of the books 'Where There is No Doctor' and a 'Manual for Good Cocoa Management', both in Bahasa Indonesia.

Results

The success of the volunteer programme depended on volunteers being prepared, which involved a number of stages. We evaluated each stage of the project and present the results of each phase below.

Building capacity

The two-day training workshop for instructors from Hasanuddin University and Swiss contact involved sessions led by the research team on *What to teach* and *How to teach*. All instructors

($n = 8$) agreed or strongly agreed that the course prepared them for teaching the volunteers. The challenges noted by the respondents included concerns about the motivation of the volunteers to learn and their own concerns about their capacity to use non-scientific terms and explain the topic in a way easily understood by the volunteers. All respondents said the resources and topics were appropriate for their level of expertise.

Instructors also evaluated their teaching the volunteers during the 4-day volunteer intensive straining commenting that the most difficult part of the programme was keeping the attention of the volunteers and ensuring that the volunteers understood the content and the skills required (Box 1).

Volunteer training

Twelve health and 12 agriculture volunteers attended a 4-day training programme covering topics selected by the village leaders (see Box 2). Twenty of the 24 volunteers applied for the position which they heard about from the elected village leader. None of the volunteers said they felt pressured to take on the role. The teaching sessions were all interactive with group work. At the end of the training volunteers were asked a number of questions, and the responses are summarised in Box 4. All but one participant agreed that the topics were presented clearly, with one person being neutral. Some challenges were noted once the volunteers returned to the village, but this was mitigated through the capacity to work with other volunteers in the village.

Mentoring and monitoring the volunteers

Each month the village was visited by two monitors (1 health and 1 agriculture) and the programme coordinator who met with the village heads to discuss progress of the programme and to address any challenges or issues. They also met with the volunteers to offer support, advice and give feedback. Box 3 and 4 summarise the issues raised with the monitors.

Activities recorded by the volunteers

A total 960 actions were initiated by 24 volunteers in the 4 villages over 6 months of the pilot (Table 1). Most contacts related to human health with the main action taken by both health and agricultural volunteers was providing information to households. When they were not able to help, a volunteer referred the family/individual to an appropriate person who could help them.

The third most common action involved the volunteer providing hands-on assistance to solve the problem (Table 2).

The volunteers were able to help in 97.5% of contacts (Table 3). Nearly 99% of volunteers said training enabled them to provide the right advice in all 950 contacts, in 10 contacts they indicated it did not. Notwithstanding the high response to adequate training 68.7% said they would like more training (Table 4). When volunteers were asked what type of additional training, there was a mixture of topics from the curriculum, new skills to be more effective volunteers and activities such as supplying farmers with resources (Table 5).

Focus groups

Stakeholders

At the end of the pilot four focus groups were held; two with volunteers and two with stakeholders. Stakeholder focus groups were held in Mapilli and Anreapi. In Mapilli focus group participants included Mapilli puskesmas officers, representative of the Landi Kanusuang village government, the Sattoko village consultative body, village midwives and farmer group representatives. Each member of the focus groups were provided with an information sheet about the programme and

Box 1. Feedback of training (March 2019, Saung Kakao) by instructors.

Question	Responses from instructors
Readiness to teach volunteers	All were very ready or ready.
How chosen to be an instructor?	Hasanuddin University academic staff, District Agricultural office or Swiss Contact.
Felt pressured to take on the role of instructor	No (all)
Field provided teaching	Health, agriculture or generic skills.
Are topics relevant to volunteers	Yes, volunteers live in the communities and are exposed to the problems, they can be the first to be approached, the topics are relevant to the whole community e.g. health of people or of plants, soil and the production system.
Main challenges faced when teaching volunteers	Maintaining interest and enthusiasm among the trainees to prevent boredom or inattention. Using layman's language so volunteers could understand.
Comfort in role of instructor	Yes (all), the work was fun and enjoyable with clear tasks; co-workers were good to work with.
The material provided was appropriate to expertise	Yes (all)
Understanding of the Village Volunteer Programme (VVP)	Yes (all), provide knowledge, improve volunteer skills and work in the community.
Agreement with the principles of the VVP.	Yes (all), agreement with the collaboration between health and agriculture disciplines making it relevant to the community; a good way to address complex problems (livelihoods); an unusual approach as it addresses agricultural and health issues in one programme; however, it needs to be designed to address structured community groups (in meetings, farmer groups, cooperative associations, health post meetings).
Sufficient time to deliver material?	Yes (4) No (2)
Improvement to the voluntary training programme for this village?	No, the amount of material that needed to be covered did not allow time to develop action plans.
Expectations as an instructor	More practical experience teaching in the field and more systematic monitoring of teaching staff and volunteers.
Easy parts of the VVP	Yes (all), awareness of requirements to teach knowledge and skills in accordance with programme objectives; using own experience to develop volunteers' understanding.
Most difficult parts of instructing volunteers	Applying principles of health in the wider environment (healthy farms, healthy farmers); mingling with co-workers; the quality of the volunteers was good making it easy to teach them.
Similar training before	Changing the community mindset about business and cooperatives; keeping volunteers' attention and concentration; ensuring they understand the knowledge and skills in the modules.
Interest in continued involvement in the future	Yes (5) No (1) – responses referred to training in their expert area.
Readiness to be an instructor in this Voluntary Work for Village programme?	Yes (all), opportunity to further develop and improve the programme; to be able to contribute to community education and development.
Most difficult as an instructor	Yes (all)
Suggestions for improving this programme?	To motivate the volunteers to apply the programme; to find the time to deliver the programme (due to busy teaching schedules); to deliver the knowledge within modules.
	Monitoring the community targeted by the programme to adjust the level of volunteer education, time availability and general skills. The training was good – more attention on training aids (materials) and time commitment (these are left to the volunteers but could be addressed more specifically in the training). The programme is integrated to address major areas (agriculture and human health) and could be applied to other villages and districts (after the pilot); while the programme develops a broad range of skills in health and agriculture, more skills needed on facilitator management (comment from generic skills trainer).

a consent form. Signed consent was provided by each participant. The Anreapi focus group participants included the head of the Anreapi *Puskesmas*, the Kelapa Dua village midwife, the Duampanua village leader, the 2nd village secretary for Kelapa Dua and the head of a farmer group. During the final workshops of stakeholders, the village heads advised they would be seeking funding to

Box 2. Feedback from volunteers about training.

Volunteer information	Volunteers recruited from 4 village in Polewali Mandar District 12 health volunteers 12 agriculture volunteers Education level varied from high school to college education No similar training prior to this volunteer training programme
Clarity of the material	Majority said the materials were clear and understood
Prior knowledge about material	Limited knowledge about topics delivered especially in health
Relevance to the community problem	All agreed that the topics delivered were very relevant to current problems faced by cocoa farmers
Perceived importance of the training	Majority agreed training would increase community awareness both in health and agriculture
Perceived of difficulties during training	Majority found the topics were easily understood, even though a few subjects were hard to comprehend (nutrition, maternal health, nutrition, plant diversification, and farmer cooperatives)
Perceived readiness post training	Majority were ready to deliver their responsibility to the community, except for a few who mentioned they needed longer duration for specific subjects, but they mentioned they would collaborate with other volunteers in their village to implement the voluntary programme
Perceived challenge post training	Several thought there were challenges when they returned to their villages, such as methods to promote the programme, changing peoples' behaviour in health and farming practices, and how to provide concrete examples for the community to understand the problems

maintain the volunteer programme from the District government. [Table 6](#) summarises the issues raised during stakeholder focus groups. The pilot programme was well understood as a result of networking in the community, the work of the volunteers, but they said that more work was required to fully engage with all the families in the villages.

Volunteers

Volunteer focus groups were held in Mapilli and Anreapi subdistricts. [Table 7](#) below summarises the main themes arising from the focus group questions. Overall the volunteers were positive about their experience. One agriculture volunteer said, 'We have started to discuss with

Box 3. Summary of the types of issues discussed by the monitors.

Type of action/information and number of times			
HEALTH		AGRICULTURE	
Vaccination of children/immunisation	2	Cocoa prices/Selling of wet beans locally	4
Sanitation/toilets	5	Price deductions caused by CBD damage	1
Gout (caused by consumption of Langsat)	1	Increasing vegetable growing	2
Garbage disposal	6	Planting Papaya -shade crop	2
Infections and Diarrhoea	3	Use of shade trees	1
Health promotion-exercise, diet	1	Fungal contamination of beans (high rainfall)	1
Nutrition/stunting	4	Pests/wild pigs, monkeys	1
Mosquito breeding sites	1	Growing additional crops to generate income-cloves, pineapple, black pepper.	1
Hand washing	4	Advice about vascular streak dieback (VSD)	1
Herbal plants for traditional medicines	2	Seedlings infected with VSD	1
Improve access to health clinics	2	Protective clothing when spraying pesticides	3
		Phytophthora pod rot	7

Box 4. Monthly monitoring report: all villages.

	Agriculture issues	Health issues	Comments
April report	<p>Vascular streak dieback (VSD) (a cocoa leaf disease) impacts cocoa production; common near the river; pod losses due to pod rot (caused by <i>Phytophthora</i>) in the coming harvest.</p> <p>Seedlings provided by the District government infected with VSD; these will not survive.</p>	One hamlet refused vaccination for young children	<p>The dusun (hamlet) households follow a conservative religious sect and cite religion as the main reason for rejecting immunisation.</p> <p>Vascular streak dieback best controlled by pruning and good nursery practice.</p> <p>Seedlings should be grown at least 100 m from mature cocoa to avoid VSD infection.</p>
May report	<p>Harvest is started.</p> <p>Cocoa bean quality is badly impacted by <i>Phytophthora</i> pod rot so that bean sorting is necessary before sale; this is the most severe problem in the higher villages.</p> <p>Bean quality is also severely impacted by the cocoa pod borer (CPB).</p> <p>High rainfall encouraged moulds (fungal contamination) of beans – these are rejected by buyers.</p> <p>High pod losses due to <i>Phytophthora</i> pod rot; the volunteers attribute this to heavy shading with fruit trees, such as durian; shade control is a solution, but these shade trees are also economically valuable.</p>	<p>Low awareness of importance of protective clothing when spraying pesticide: volunteers very active in reducing pesticide use and promoting management or organic methods.</p> <p>Gout has increased; partly a result of increased consumption of Langsat (a fruit in season).</p> <p>Community members especially in Kelapa Dua raise the issue of waste management; there is no waste collection and garbage is disposed down slopes behind the houses.</p> <p>Infections led to diarrhoea in a number of households; volunteers talked to household members about the importance of sanitation (hand washing and clean water).</p>	<p>The main annual harvest: May to July</p> <p>Pod rot causes serious losses of cocoa pods and also impairs bean quality. Volunteers promote sanitation (early removal of diseased pods).</p> <p>CPB damage leads to discounted prices from collectors.</p> <p>Villagers resort to selling wet beans (straight after harvest) at lower prices; village leaders in all 4 villages are aware of the waste management problem; volunteers emphasise the health hazards of poor waste management.</p> <p>Heavy shade increases fungal disease and pod rot, but the traditional farming system uses shade trees for various purposes (fruit, timber).</p> <p>Low and variable prices sometimes deter farmers especially as bean quality is lowered by the cocoa pod borer. Reluctance among farmers to apply better management practices.</p>
June	<p>All villagers are busy with the peak harvest; bean extraction, sorting and drying; wet bean sales are getting high prices from a Japanese firm with a local fermentary which ferments the beans for chocolate production in Japan.</p> <p>Mostly farmers dry their beans; however, the beans are only dried for two days (frequent rain makes complete drying impossible).</p>	<p>Volunteers join the monthly District health meetings held in each village to promote better health practices, especially for older citizens; this includes group exercises, and measuring blood pressure and cholesterol levels (by the Puskesmas staff).</p> <p>Volunteers join Posyandu activities for young children; they talk to parents about nutrition and the role of immunisation</p>	<p>Volunteers participate in the District-driven health meetings, promoting healthier practices.</p> <p>Two-day dried cocoa beans fetch a lower price due to higher moisture content; variable prices is an issue raised by farmers as they do not have a guaranteed market but rely exclusively on local collectors who set the prices.</p>

(Continued)

Continued.

	Agriculture issues	Health issues	Comments
	Removal of empty pod husks important to reduce mosquito breeding sites.	Diarrhoea problems reported in children	Treatment provided by Puskesmas staff; volunteers say awareness of sanitation is low (and unclean drinking water is used). Agricultural practices link to health as removing pod husks which hold rainwater also reduces breeding sites for mosquitoes.
July	Papaya promoted as an early shade crop for cocoa and good income generator.	Health volunteers are encouraging the planting of herbal plants to use for traditional treatments; the idea came from the book <i>Where there is no Doctor</i> , provided by the AIC project.	Herbal gardens not accepted by all households but village head (Masdar) strongly supports the programme.
	Farmers are concerned about price variability; neighbouring villages may receive higher prices for the same product; also, their product is generally higher in quality, but collectors are not rewarding quality sufficiently.	Bamboo waste bins are planned by the village leadership; discussions with volunteers held by the village.	Health promotion officer from Puskesmas visited with volunteers and gave advice on sorting waste; remote villages have less choice in marketing their produce and rely on prices provided by collectors.
	Village in the hills is badly affected by pests, especially wild pigs and monkeys; these are very difficult to control. Farmers have to monitor their trees continuously.	Open defecation free programme is being run in villages.	Village heads have been using village annual fund for toilet construction.
		A major issue on all villages is childhood stunting; volunteers talk to households about early nutrition (Puskesmas staff also provide food supplements to boost the usual diet of infants).	
August	Protective clothing promoted as important for spraying pesticides by volunteers. Pod husk disposal and the construction of pits encouraged.	Households in village are encouraged to plant herbal species alongside vegetables. Garbage pits to be constructed; discussions held on waste management between volunteers and village leadership.	Growing vegetables is seen as a part of the District programme to reduced childhood stunting.
	The benefits of diversification are realised with more farmers growing papaya (which can shade young cocoa); goat integration and fish farming.	Volunteers accompany elderly to the Puskesmas run programmes that promote healthier diets and lifestyles, and also home again.	By escorting community members to the Puskesmas meetings they also talk to them about the importance of diet and exercise.
September	The Japanese company flies selected farmers to Jakarta to a meeting on cocoa farming practices and the importance of quality (avoiding CPB and fungal damage).	Planting herbal and vegetable gardens continues in villages	This company has stimulated farmers who sell their wet beans; a high level of sorting necessary so that all beans sold are 'healthy'.
	The harvest is over; nearly all income comes from cocoa, making it vulnerable to failed harvests; however, 2019 has had a good harvest and active market	Village leadership have a generally high awareness of the problems of stunting, waste management and toilets for all community members; village leaders see a positive role for volunteers in these efforts	Talking to more reluctant community members is necessary with the support of village leaders like Masdar The village leader partly attributes improved incomes to the volunteer programme.

Table 1. Total contacts recorded by volunteers.

Contact recorded	<i>n</i>	%
Agriculture volunteer	356	37.1
Health volunteer	604	62.9
Total	960	100

our village head about the opportunity to continue this programme including the chance to use Village Fund Allocation to support this programme. Similarly, a health volunteer said

The health of the farmers and the health of their cocoa are very important since most villagers here have their income from cocoa. If they are healthy, they can spend more time and energy in their cocoa farm. It will be very good for all of us here if the programme does not stop by the end of the year. I hope the village will take over this programme. Our village head so far is supportive.

Volunteers said that the longer time they spent with the villagers the better rapport established. One health volunteer captured this

As we continue doing our work and showed our persistence to share new knowledge on health such as how to improve nutrition for pregnant mothers or children, gradually some people in my hamlet become more keen to be engaged as they start to take initiatives such as asking questions. I can feel their appreciation grow as I keep doing my work (as a volunteer).

An agricultural volunteer said

At the first few days, some villagers asked me question like – why do you waste time doing this (activities as a volunteer). I just said because I want to try to contribute good things to my village. I keep coming to their house or farm and informally talk about anything and gradually they start to share their issues and we start to discuss problems such as the need to regenerate the cocoa trees. From this, other issues emerged, and we continue to discuss. I am not teaching them because they also actually have knowledge. This kind

Table 2. Type of contact with the community.

Type of contact with community	Agriculture (<i>n</i> = 356)		Health (<i>n</i> = 604)		Total (<i>n</i> = 960)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Provide information	217	60.9	318	52.6	535	55.7
Told them who/where to go for assistance	85	23.9	101	16.7	186	19.38
Accompanied the person to a health facility	5	1.4	48	7.9	53	5.5
Accompanied the person to an agricultural facility	23	6.5	9	1.5	32	3.3
Provided hands on assistance to help manage the problem	57	16	111	18.4	168	17.5
Organised a village meeting	61	17.1	40	6.6	101	10.5

Table 3. Outcome of volunteer contact.

Contact results	Agriculture (<i>n</i> = 356)		Health (<i>n</i> = 604)		Total (<i>n</i> = 960)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<i>Able to help</i>						
Yes	348	97.8	588	97.3	936	97.5
No	8	2.2	16	2.7	24	2.5
<i>Reason for not able to help</i>						
Did not know what to do	1	0.3	6	1	7	0.7
No resources	2	0.6	2	0.3	4	0.4
The person did not need any assistance	1	0.3	5	0.8	6	0.6
There was no time	2	0.6	0	0	2	0.2
Other reason	2	0.6	3	0.5	5	0.5

Table 4. Perception on volunteer training benefits.

Information from training helpful	Agriculture (n = 356)		Health (n = 604)		Total (n = 960)	
	n	%	n	%	n	%
<i>Did you think the training provided you with the right information to help the village community?</i>						
Yes	353	99.2	597	98.8	950	98.9
No	3	0.8	7	1.2	10	1.1
<i>Do you need additional training?</i>						
Yes	112	31.5	420	69.5	660	68.7
No	240	67.4	127	21.1	239	25
No answer	4	1.1	57	9.4	61	6.3

of informal engagement helped me to do my job and several other villagers become more enthusiastic to be involved in discussions.

Most volunteers said their role was important to increase awareness about health issues. Over time they said their role was gradually appreciated by villagers. Volunteers expected the current volunteer programme is achieving increasing support by their village leaders and will continue after the pilot project ends. One volunteer said,

Table 5. Type of additional training mentioned by the volunteer.

Skills acquisition	Type of additional training mentioned	
	Health	Agriculture
Approaching community	Nutrition	Weed management
How to convince farmers to apply good agricultural practice (GAP)	Sanitation	Organic Fertilizer
Effective Communication	Healthy behaviour	Trimming Techniques
Time Management	Traditional medicine	Good Farming Practices
Community empowerment	Medication	Plant diversification
Basic life emergency supports	Extended training on health material	Personal Protection Equipment from Farmers
Behaviour Changes	Environmental Health	Organic Fertilizer
	Garbage disposal and management	

Table 6. Summary of focus group for stakeholders.

Question	Agriculture and health themes
Knowledge about the volunteer programme?	All participants knew about the pilot programme. As an example, the head of a farmer group held meetings with agricultural volunteers. In addition, the volunteers had shown farmers how to prune their trees, care for cocoa generally and other activities. Stakeholders said they knew about the volunteers from their contacts in the community. Village midwives and village Posyandu met with volunteers and had been informed about their role as well as passing on information to the village about the programme. There still needs to be more work in informing households in the village about the volunteer programme. Health volunteers were involved in activities carried out by Puskesmas such as Posbindu and Prolanis (programme for elderly health run by the health centre).
Support for the volunteer programme?	Everyone supported the programme saying that they wanted it implemented in all villages so communities can increase health awareness and improve family economy. They all said the programme should be widely promoted so that households can benefit from their advice. Importantly the health department through outreach clinics (Head of Puskesmas) strongly supports programme and plans to improve communication and cooperate with the volunteers. The volunteers were perceived as very helpful in improving health. There was a suggestion to expand into occupational health.
Sustainability of the volunteer programme?	Everyone said that the volunteer programme should be expanded to other villages. In the pilot villages the Head of Duampanua and Secretary of Kelapa Dua said they would continue the programme after the pilot.

Table 7. Summary of focus group for volunteers.

Question	Themes
Value of training for the volunteers?	All volunteers mentioned new knowledge and skills helped them do their job. Health volunteers said that knowledge about human health (clean water, germs and infections, sanitation, different kinds of diseases such as TB or typhoid, stunting as well as nutrition and having a balanced diet) was beneficial. Agricultural volunteers said new knowledge about pests and pest management as well as time management and financial literacy were important and helped them in talking to farmers.
Need for additional training?	While all agreed that training was sufficient 5 volunteers said they would like to have a refresher course as new issues not discussed in the training arose. Health volunteers gave examples of stroke, diabetes, cancer, mental health, depression. Agricultural volunteers gave examples such as how to initiate farmer cooperatives. In Anreapi it was suggested that demonstration cocoa plots in each village would be a better way to show farmers what they could do to improve farm management.
Main challenges in being a volunteer?	Early in the pilot several villagers refused to engage in conversation because they were busy. This problem was overcome by finding a time suitable for the family. Another challenge was balancing the role of volunteer with their need to earn an income.
Support for the role of volunteer?	Volunteers said initially they were nervous at first but with time gained more confidence. Volunteers in Anreapi said they were helped by support from the wife of the village head, the village midwife and the village agricultural extension worker (penyuluhpertanian). Volunteers in Anreapi (Kelapa Dua village) were also asked by the village head to focus on reducing stunting for which he provided additional transport incentives.

I really hope that the village head will realise his support to our programme and continue this (programme). If we keep coming to talk to the people about their health or their plant health, they will gradually do better. It takes time, not just coming to them one time and they will change. That's why this programme should be continued.

Discussion

Volunteer programmes historically are difficult to sustain either because of volunteer depletion, lack of support from the community and/or lack of continuing development of the volunteers (Kane et al., 2016; Nasir et al., 2016). Our One Health village volunteer programme addressed these challenges by training six volunteers in each village rather than just one or two. By training six volunteers we reduce the potential for 'burn out' that can happen when volunteers have too many demands made on them by the community. In addition, a team of six from different backgrounds is more likely to have a spread of knowledge and skills to solve/assist most households. A team of volunteers also allows time for them to manage their personal affairs and attend to unexpected events without the programme stopping.

Another challenge with volunteer programmes is sustainability. Besides the principle of integrative approach covering both human health, crop-plant health and environmental health, another important principle of One Health Research is sustainability (Charron, 2012; Lebov et al., 2017). To be sustainable the programme had to be culturally, socially and environmentally sustainable in the long term. Volunteers were socially acceptable because they were appointed by a village committee; they were environmentally and culturally sustainable as their training was based on the evidence from public health and agriculture as well as existing health conditions and agricultural needs identified by the villages themselves. The results showed that volunteers were able to help in all but 10 contacts.

Many volunteer programmes do not include mentoring and monitoring in their programmes. The use of the CommCare mobile application to record their work was a significant factor in keeping the volunteers motivated as well as keeping a timely record of the activities. It also maintained a connection between the trainers/research team, advisers and the volunteers. The communication via the mobile application helped in minimising the isolation that volunteers can sometimes experience after training ends. Feedback from studies show that ongoing coaching/mentoring is an essential part of sustainability (Kok et al., 2015). This project evaluated the quality and quantity of the

volunteers' work with regular reports by the volunteers on their activities as well as monthly visits from mentors when challenges and problems were discussed.

The following three ingredients were core to the success of the programme: careful preparation, strong support from the major stakeholders, enthusiastic volunteers and strong support from the village leaders. Our volunteers had to apply for the position and were interviewed as part of the selection process. The selection criteria was developed in consultation with the village leaders. This open and transparent process helped in establishing the role of the volunteer and have it accepted by village households.

All stakeholders, including the Government representatives from the health and agricultural departments, confirmed the value of the programme in empowering households to improve their livelihoods. The elected village officials were cautious at first and wanted to see the evidence of the value of the programme before committing to ongoing budget support. Because the project included evaluations at each step and also recorded the activities undertaken by the volunteers the village leaders had the evidence to support the sustainability of the programme by including funding to pay the volunteers in the annual budget to the West Sulawesi Provincial Government. The volunteers also have the capacity to be upskilled and receive further training in the curriculum as all the instructors for the village volunteer programme are all from Sulawesi.

Conclusion

This pilot of a village volunteer programme was designed as an empowerment programme to improve livelihoods of communities who live in extreme poverty. The results show that village volunteers with appropriate and careful training by instructors (from their own culture) can make a difference locally. Accurate and timely information about health and agriculture can give households the tools they need to change their behaviours. Village communities today are an underutilised resource, yet they have the expertise of their lived experience and with the right resources are in the best place to make the changes necessary to achieve the 17 Sustainable Development Goals (SDGs).

Acknowledgements

This work was funded by a grant from the Australia-Indonesia Centre. The participating volunteers in the programme were: Hidayanti, Muhlis, Rahmania, Nurhidayah, Abdul Kadir Mastu, Nurlina Sabir (Duampanua Village); Herna Basa, Muammar Syah, Bahri, Murtini, Eka Alfionita, Muliati (Kelapa Dua Village); M. Anwar, Nolbi, Budi, Asriani, Alfianita, A. Latif (Landi Kanusuang Village); Rusli, Rudi, Rasmudi, Restu, Nur, Afrida (Sattoko Village). The volunteer training instructors were Syamsuar, Devintha Virani, Arman Abbas, Jumriani Ansar, Elvita Bellani, Hasnawati Amqam, Triani Arfah, Andi Tenri Kawareng, Saharan, Rauf, Burhanuddin and Pasenanggi. Special thanks to Andi Suaib Nawawi and Muh Sukri Arif (Polewali-Mandar District Health Office), and Ibrahim and Faisal (District Agricultural Office).

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by The Australia-Indonesia Centre.

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