



Improving Indoor Residual Spraying for Malaria Elimination: Emulating Success Factors, Lessons Learnt and Best Practices from Cholera Out-Break in Zambia

Kooma EH^{1,*}, Cheelo M², Chisanga A², Chifwesa A², Wakunuma T², Nyirenda C³, Mwansa B², Nsofwa F², Phiri E², Chirwa B⁴, Zinyengere D⁵, Hansende W³, Banda R³, Bwenje F³, Mbanga L³, Malawo O³, Shabukali V³, Chanda J⁶, Sanka M² and Munachilemba O³

¹Ministry of Health, National Malaria Elimination Centre, Vector Control Unit, Lusaka, Zambia

²Ministry of Health, Provincial Health Offices, Zambia

³Ministry of Health, District Health Offices, Zambia

⁴Presidential Malaria Initiative/Vector Link, Lusaka, Zambia

⁵ZEDEC-Health Environmental Development Consulting, Zimbabwe

⁶MACEPA, PATH, National Malaria Elimination Centre, Lusaka, Zambia

*Corresponding author: Kooma EH, Ministry of Health, National Malaria Elimination Centre, Lusaka, Zambia; Texila American University, USA; Tel: 0973977780; E-mail: emmanuel.kooma@gmail.com

Received date: 30 July 2020; Accepted date: 08 August 2020; Published date: 13 August 2020

Citation: Kooma EH, Cheelo M, Chisanga A, Chifwesa A, Wakunuma T, Nyirenda C, et al. (2020). Improving Indoor Residual Spraying for Malaria Elimination: Emulating Success Factors, Lessons Learnt and Best Practices from Cholera Out-Break in Zambia. SunText Rev Med Clin Res 1(1): 107.

DOI: <https://doi.org/10.51737/2766-4813.2020.007>

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Abstract

Indoor Residual Spraying has been one of the most effective malaria vector control interventions that play a key role in malaria elimination. The effective use of the intervention has been found to require strong program capacity structures and systems at all levels. The objective of this paper has been to contribute and supplement to achievement of the national malaria elimination targets set for Indoor Residual Spraying by making the program more efficient, cost effective, ecologically sound and sustainable for impact. Zambia's cholera out-break has many successes, lessons learnt and best practices to emulate. The best practices could be learnt from both the public and the private sector for maximum impact. Connections have to be established at all levels of delivery. The good quality delivery operations depend upon strong program leadership and well monitored service delivery management systems through good planning, commitment, rigorous implementation, strict supervision, careful monitoring and evaluation. Motivation and retention of staff and community engagement at the initial stage provide good feedback and response. The reorientation from malaria control to elimination does not entail changing the entire malaria vector control strategies or interventions but rather refocusing and intensifying those already in use, for the purpose of malaria elimination.

Keywords: Indoor residual spraying; success factors; lessons learnt; best practices; cholera; Zambia

Introduction

There are many factors that influence Indoor Residual Spraying (IRS) success or failure. While IRS may have clearly defined set of variable objectives of value, implementation of activities alone

might not be enough to ensure the program's success. There are many other factors that have been found to impact on the development of IRS and these may vary depending on the program: nature, context, size, complexity, formality and environmental factors. The successful Indoor Residual Spraying

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Campaign depends upon well-organized planning and proper monitoring and supervision at all levels; timely feedback through monitoring allows appropriate corrective measures. The advocacy of political, traditional/community leadership and sensitization (awareness raising) of the community plays an important role in achieving the goal of the IRS activities. This Indoor Residual Spraying Campaign document establishes a platform for further improvement of the campaign program for the 2018/19 and beyond the spraying period. The document also describes the challenges and opportunities that need to be mitigated and exploited respectively to improve the Indoor Residual Spraying program. It provides a strategic direction with full display of applicable opportunities for 2018 and beyond. It establishes requirements for improvement from the success factors, best practices and lessons learnt from the field situational analysis feedback exercise that was undertaken from stakeholders, partners and selected individuals and from eight (8) provinces of Zambia [1].

Success factors

The Indoor Residual Spraying success factors rely upon the ownership of the program by level leadership with a clear understanding of the reasons for the existence of the program; who is it for and what is it? What does the government say about achieving the legacy goals. As this might be a factor influencing the tailoring of program activities to better suit the IRS program environment. Different ownership might translate in different stakeholders taking part in the decision making process. There has been a need for support and participation of the major stakeholders/interested parties to ensure a controlled development of the Indoor Residual Spraying Campaign program. A clear and feasible planning of the various management stages have been found essential to reduce the level of risk. This will also avoid scope-creep; communication amongst all interested parties and a clearly defined hierarchy within the IRS program management team to help control the program and prevent or manage adverse events; the right choice of people for the IRS team at every level in order to ensure that the required skill has been set to deliver the program's products is present. Motivation of the parties involved in the program to foster better collaboration and hence a greater awareness of each other's responsibilities. The mentioned success factors are usually accompanied by some sector specific aspects that deal with the principle of sustainability. This includes the concept of a program delivering a product with the potential for long term benefits that continue to improve the social and economic wellbeing of the communities into the future. These are not limited to the program as they promote a sustainable environment where positive impact on the environment and local culture endures in the long term, while the economy and employment opportunities for local people are improved [2,3].

Lessons learned

It has been important that vector control unit can learn from various experiences and pass on to the future vector control programs from the lessons gathered during the vector control program life cycle. Learning from experience the fundamental principle and best practice of vector control programs are unique and challenging. Therefore, vector control teams must seek to learn from the experience of others and from previous and current events. Evaluating, what has gone right/wrong within a particular activity or part of the program allow to recreate/avoid that particular event in order to improve efficiency in current vector control programs or projects [4].

Best practice

This could enhance program-wide best practice related to program management and lead eventually to the creation of Centres for Excellence that become the Focal Point for the application of best practice. Stakeholder and partners must be clearly represented within the program team thus improving and promoting a wider understanding and support [5].

Collaborative approach

There have been twelve identified but related motives and reasons that could help vector control program implementation for multi-stakeholder collaboration and their associated benefits to the program excellent performance. In the context of sustainability, vector control program requires a strong process of collaboration at policy, program or community level to allow collective decisions taking and jointly agreed or collective actions [6].

- Reflect on multiple aims and agree on common targets
- Vector control Program to ensure inclusiveness and equity and sharpen focus and coordinate actions;
- Raise awareness and engage those with power outcomes such as the Minister of Health
- Link components in program value chain;
- Strengthen long term support and commitment;
- Pool knowledge and skills from various stakeholders and partners
- Strengthen resources and funding
- Widen contacts and strengthen communication across government and private sectors
- Add value and creativity through knowledge research across literature review
- Share costs and risks-economies of scale across boundaries

Methods

Open ended questionnaire was used to dig deeper in the experiences of the field staff at provincial health offices, district health offices and partners; the way they felt indoor residual

Spraying campaign could be improved in Zambia. Nine out of the 10 provinces responded to the questionnaire in exception of Eastern and Copper belt provinces who did not respond. The questions and responses per province have been put in the tables. Literature review was from published articles, vector control handbooks, indoor residual spraying manuals for malaria elimination, a hand book on a Frame Work for Malaria Elimination were reviewed to give insights and compare and contrast the position of implementing indoor residual spraying during the campaign seasons. Comparisons of success factors, lessons learnt and practices during cholera out-break of 2017/18 were emulated for best practice and impact. The thematic areas were support supervision, community engagement, capacity building of both technical and community based health workers, collaboration with partners and government sectors, social and resource mobilization and areas that can make Indoor Residual Spraying fail including operational research for decision making.

Research Questions

The following questions were used to obtain insight into the current Indoor Residual Spraying status in Zambia, its awareness, and the possibility of successful implementation of the program for malaria elimination.

- What are the success factors, lessons learnt and best practices for cholera out-break in Zambia [2017-2018]?
- From your experience how can we improve Indoor Residual Spraying campaign assuming that all logistics are in place and that implementation of the program can start at the right time?
- Which thematic areas of Indoor Residual Spraying Campaign do you recommend to improve at each implementation level assuming all logistics and resources arrive at the right time and are in place in your province or districts?
- How do you think we can improve supervision to IRS implementation to districts and to field activities?
- How much have we engaged the community in implementing Indoor Residual Spraying in our provinces or districts? (Qualify)
- Which areas do you feel capacity has to be built for effective Indoor Residual Spraying?
- How has been the collaboration in IRS implementation within the health sector and other sectors in our provinces and districts?
- How far has our advocacy on social mobilization and resource mobilization being organized with local leaders, implementers and communities and other stake holders (Business Community)?
- Have we ever conducted an operational research /assessment /survey for IRS Campaign in our province/districts? If any what were our findings and recommendations to that effect?

- What can make us fail in Indoor Residual Spraying campaign as a Province or District?

Results

The findings on improving the implementation of Indoor Residual Spraying in Zambia are presented in the tables below. There were a total of 20 participants and out of these 17 males and 3 females. All interviewees agreed that Indoor Residual Spraying was a good intervention that could significantly contribute to malaria elimination agenda for Zambia. The participant's opinions on the magnitude of issues surrounding failures, best practices, lessons learned and successful implementation of Indoor Residual Spraying are summarized in tables.

Success factors, lessons learned and best practices from 2017/2018 cholera out-break

The Table 1 summarizes the success factors as: Quality leadership with a focus, community engagement, resource availability, implementer commitment and capacity building of staff (ongoing). Lessons learnt were stakeholder involvement and other government sectors. Strengthened supervision, quality monitoring, thematic working groups, communication and reviewing of the program with feedback. The best practices were stratification of problem areas, existence of communication plan, engagement of relevant stakeholders and civil society. Technical guidelines were also available for reference by field staff including the need for community engagement as one of the principal basis to implement activities in the community (Table 1).

Situational analysis and recommendations by the provincial health offices on improving IRS campaign program in Zambia

Table 2 provides a situational analysis from the provinces. Two provinces did not provide a feedback to the situational analysis however weak community engagement by levels was observed across all the provinces. The logistics for indoor residual spraying were inadequate at all levels and included inadequate partnership engagement. The remuneration for Spray operators was found not to commensurate to the work involved by the spray operators. There was no strict following of the indoor residual spraying calendars. The campaign most of the time lacked adequate quality spray. There has been a need for strengthened community mobilization with adequate number of sensitization days to the communities. Operational research was not conducted to understand the views of the community. Community indoor residual spraying was recommended by all provinces to be the next intervention that can make impact towards malaria elimination agenda. The financial resources were also another

area that needed to be decentralized to the provinces with strict monitoring of its use (Table 2).

Table 3 Effective implementation of Indoor Residual Spraying has to be central part of malaria control strategies where IRS is appropriate. IRS is implemented with the objective of reducing morbidity and mortality and accelerating progress towards global and community malaria agents. The important considerations surround the need to strengthen social mobilization and community engagement, regular performance review meetings, strong involvement of provincial supervisor's capacity building, improvement of storage facilities and working bays. Adequate transport, strengthened monitoring and evaluation and supervision itself, number of spray days has to be increased including mapping and strengthened HMIs (Table 3).

The supervisory skills at all levels are an integral factor in how well a supervisor relates to his subordinates. Supervision for quality performance was found lacking especially at all levels. Regular review meetings to improve supervision were cited and need to be implemented during, before and after spraying campaign. The training of TOTS period of training to have more and must include Provincial Health Staff as first step to engage provincial leadership. The storage facilities at all levels to be adequate to accommodate material logistics. Monitoring and supervision was to be strengthened at all levels. The supervision has to be extended to assess adequacy of changing rooms and operations of the Malaria Task Forces (MATFs) (Table 4).

It shows the critical areas for strengthened community engagement in order to get people better connected into community and for ensuring that services designed next. The concept of community involvement in improving health outcomes has its roots in the action that communities have always taken to protect and support their members. Roles of key affected populations with malaria, community organizations and networks and public or private sector that work in partnership with civil society at community level in design delivery, monitoring and evaluation and supervise its self. Number of spray days has to be increased including mapping and strengthening Health management information system. Capacity building helps identify obstacles, gaps and opportunities as identified by all provinces. Capacity building has been known for strengthening capacities in IRS and entomological surveillance system for staff data collection, analysis and management especially for monitoring insecticide resistance. Capacity building has opportunities for strengthening infrastructure for IRS and laboratory and insectaries. There are also opportunities to use information. Building community capacity has been foundation to both prevention and treatment of malaria from creating demand for IRS and LLINs to increase trust between health worker and community volunteer (Table 5).

Collaboration in IRS implementation remains cardinal to achieve sustained malaria elimination. The health system at all levels must assume its stewardship and leadership role and exercise its mandate to coordinate efforts related to malaria elimination. Technical capacity also needs to exist among competing technical needs. PMATF, DMATF and CATF and national MATFs must exist for coordinated efforts. Intra and Intersect oral collaboration with adequate representations from various policy actors and strengthened channels of communication must exist at all levels of the health system (Table 6).

Resource mobilization has been described as: giving people the opportunity to give. It is not an end in itself but rather the process whereby resources are transferred from those who are able to give to those who have the need to receive. The mobilization of resources facilitates this process. Resources are the enablers of an activity that not only satisfies the need, but also satisfies the giver that their contribution has been wisely and effectively used. This term is used to be more comprehensive than the usual "fundraising". Fundraising suggests that someone else has funds and approaches need to be devised to access their funds. Resource mobilization includes two other concepts; first, that non-financial resources are also important; and second, that certain resources can be generated by the NGO rather than accessed from other sources. Resource mobilization is asking. While most people are willing to give to obvious and needy causes, only on rare occasions will people give without first being asked. No matter what the communication methods we use to convey the message of need, if this does not include an ASK, effective response will not take place. How can an organisation raise the income needed to carry out its mission? Where are the required resources? How do you sustain your organisation and work? These are the key questions confronting organizations when they consider how to maintain their work and strengthen organizational sustainability. Developing a plan or strategy for resource mobilization can lead to creative efforts in using your own local assets to gain support for your organisation. Multiple sources of funding can increase your independence and flexibility to implement programs and reduce reliance on external (or foreign) funding. With increased competition for scarce grant resources, thinking of, and creating options for new, diverse, and multiple funding streams will help your DHMTs manage their own programs (Table 7).

Operational research has been known to improve public health evidence-based decision making. Districts are encouraged to further start researching on vector control activities and publish papers (Table 8).

Shows the gaps for IRS that make it to some extent fail to make an impact. Late implementation shows lack of seriousness at national level as IRS logistics have never been adequate and the program always starting late, lack of engagement of key stakeholders, inadequate funds, storage facilities, weak

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coordination of IRS activities, weak social mobilization, inadequate structures and implementation levels, weak monitoring and evaluation have made IRS fail year in and year out (Table 9).

Experiences across provinces has shown that stakeholder commitment, leadership engagement, advocacy, capacity building, operational research and political commitment including social acceptance of Indoor Residual Spraying and information management remain critical to improvement of IRS supplemented by intensified monitoring and supervision (Table 10).

All the thematic areas mentioned by partners are very cardinal to the successful implementation of IRS at all levels of implementation. Implementers have to spend time to learn the thematic areas. The thematic areas are systemic and managerial in nature (Table 11).

Capacity building helps to identify obstacles. The gaps and opportunities have been provided by all provinces for capacity building. Capacity building has been known for strengthening capacities in IRS and entomological surveillance system for staff data collection analysis and management especially for monitoring insecticide resistance. Capacity building has opportunities for strengthening infrastructure for IRS and laboratories including insectaries. There are also opportunities to use information, communication technology to more effectively collect and respond to epidemiological and entomological data and to the planning and implementation of vector control interventions like IRS.

Malaria control remains a leading health challenge everywhere in Zambia. Indoor residual spraying (IRS) has been an effective strategy to control malaria transmission, but there are often barriers to reaching the coverage necessary for attaining maximum community protective effect of IRS. Community engagement has been recognized as one of the key components for successful health interventions including malaria control [7,8]. However, in practice community engagement has often played a marginal role within malaria control and elimination program. Community engagement increases knowledge among families and communities concerning malaria, its transmission and understanding that the mosquito is the only vector of malaria. It further promotes communities' uptake of malaria prevention methods including the collect and consistent use of vector control interventions in their homes and uptake of other interventions. Community groups and CBVs play a key role in improving the demand for health services and bringing positive changes in individual health practices and social norms [9]. It is quite important to recognize the vital role of community structures such as Health Neighbourhood Committees & community based agents in generating community involvement and ownership of malaria control and prevention ultimately malaria elimination efforts. There has been a need to build capacity to the structures to

develop locally relevant malaria awareness, education and mobilization activities within their own communities (Table 12).

Community capacity building principally expands, diversifies and promotes community participation, expanding community leadership base while at the same time strengthens individual skills. It encourages a shared understanding and vision promotion and provides a strategic community agenda. It further facilitates consistence and tangible progress towards goals. Capacity building creates effective community planning, organization and promotes resource mobilization and utilization by the community (Table 13).

Show how effective use of IRS requires national program capacity, structures and systems. Together the public and private sector can continue to develop IRS best practices and strengthen IRS capacity. The private sector has an important role to play in reducing the malaria disease burden in Zambia through IRS. Companies can protect their workers and communities by developing local IRS programs, and can also leverage corporate strengths including logistics, distribution and communication to maximize the effectiveness of national, provincial, district programs and strategies (Table 14).

Explains the way resource mobilization (RM) has been a comprehensive process involving strategic planning, advocacy, communication and negotiation with donors'/policy makers, communities, business community and sound management of resources. Resource mobilization, based on these tenets, strengthens the credibility of vector control and ensures both enhanced coordination and harmonization among malaria elimination partners. Opportunities for resource mobilization exist everywhere at every level. These opportunities need to be systematically explored, seized and even created by the IRS implementation levels and its environmental health units at provinces, districts and national levels to maximize positive health outcomes (Table 15).

Discusses the operational limitations and methodological gaps that have been associated with malaria control interventions that need research. These limitations and gaps have necessitated the need for well-tailored Malaria Operational Research (MOR) agenda for each province especially during IRS implementation. However, there is paucity of evidence-based information on relevant stakeholders' experience, awareness, perceptions and use of MOR and suggestions on setting MOR agenda. As part of a larger study to provide data for national, provincial, district MOR agenda setting, there is a need to assess the MOR research situation from the perspectives of key stakeholders in Zambia and provinces and contribute to MOR to the malaria elimination agenda for the country (Table 16).

The failure of Indoor Residual Spraying Campaign(IRS) has been very systemic more especially the supply chain management, leadership approaches, vision oriented by implementers and

identification of stakeholders and involvement of key stakeholders can strengthen indoor residual spraying at all levels.

Discussion

This report brings together all known records of many case studies that aim for policies, guidelines and the program not to be optional additions, but to be established as a new way of doing business. What is important is to make incremental changes to the program.

Engagement of policy actors

There must be a creation of engagement of a network of Policy Actors to champion Indoor Residual Spraying Campaign program and strengthening intersectoral collaboration. This could help to open up traditional organizational boundaries and support coordination during Indoor Residual Spraying preparations, implementation campaign, monitoring and evaluation and decision making including policy change in some part. It is quite important to have an approach to collaborative policy development and not merely a technocrat planning approach. It is important to embody a whole of society and a whole of government vision.

The policy Actors shall come from the following cross-sectoral and multi-sectoral governance as a strong and critical mandate:

- Minister of Health,
- Minister of Environment
- Minister of Water and Sanitation
- Minister of Defence
- Minister of General Education
- Minister of Tourism
- Minister of Local Government and Housing
- Minister of Agriculture
- Minister of Livestock and Fisheries
- Minister of National Parks
- Minister of Traditional Affairs
- Zambia Environmental Management Agency (ZEMA)
- Water Management Agency (WAMAR)
- Zambia Sugar Company
- Ministry of Transport and Communication
- Ministry of Mines & Mines
- Other relevant Partners & Stakeholders.

As we drive our Goal of ending malaria, putting in place a governance structure to oversee Indoor Residual Spraying Campaign Program as a Whole-of-Government and Whole-of-Society Approach is needed to ensure long term benefits. Good governance drives the implementation of work across sectors, builds ownership and increases exposure to collaborative opportunities (Table 17).

Development of statutory instrument (SI)

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There has been an urgent need for the development of a Statutory Instrument (SI) for Indoor Residual Spraying to increase acceptance rate for universal coverage of the intervention to the population. Vector control could be improved by basing it on local evidence, by integrating interventions where appropriate, and by collaborating with divisions within the health sector and with other public and private sectors, and also actively engaging communities. Existing policies related to malaria vector control such as the Mosquito Extermination Act, National Health Policy, National Malaria Elimination Strategic Plan, the Malaria Business Plan, the Public Health Act Cap 295 of the Laws of Zambia, current guidelines for Malaria Vector Control, legislation and regulation of pesticides and current vector control programs. These policies might have to be amended or rephrased in order to increase support for Indoor Spraying Campaign for Zambia (Table 18).

Strengthening or formation of inter sectoral steering committee

An intersect oral Steering committee on Indoor Residual Spraying or vector control in general with support of the Minister of Health is vital to establishing intersect oral collaboration. The Steering committee will function as an inter-ministerial governing body with responsibility to facilitate harmonization of policies and institutional arrangements and to provide strategic direction and coordination for implementation of Indoor Residual Spraying activities. There is a need to develop Terms of Reference for the Steering Committee to differentiate it from the Technical Working Group (TWG) functions. In order to have sufficient political “clout”, the members of the steering committee should be senior staff, such as directors or assistant directors of departments of or institutions. They should represent several ministries “Policy Actors” as indicated in the previous paragraph. The Steering Committees to be at every level (Provincial Health Office, District Health Officer & Community) as a replica of the ministries who act as “Policy Actors” (Table 19).

Community engagement

The community has to be incorporated as primary stakeholder, the community voices have to be incorporated to help shape action on community participation on Indoor Residual Spraying Campaign Program [Minister of Traditional Affairs]. They must be involved in the selection of Spray Operators[SOP] from community based volunteers, monitoring and evaluation, participation in indoor residual spraying, formation of community and model implementation. Malaria elimination and sustainability of the malaria-free areas depend on the behaviours and day-to-day activities of the affected communities. If awareness is raised in communities and the communities are with the necessary information, they two can exert pressure on developmental



programs under the required mitigation actions for reducing malaria risks related to their project activities.

Raising the awareness of the communities and their leadership on the importance of being involved in malaria elimination and prevention of re-introduction, and their engagement and participation in these processes in their areas are critical. The community needs to be informed when there is a shift in the malaria strategy and should be able to contribute deliberately to the success of malaria elimination efforts and sustenance of free malaria states in the post elimination period. The traditional, political, religious leaders and civil society, women groups and youths including school children have to be seriously engaged.

Intra and intersect oral collaboration

It has been important to share information and raising awareness among sectors about the roles and responsibilities of the various stakeholders in Indoor Residual Spraying Campaign. The structure at these levels (PHO, DHO AND RHC) is just like the Steering Committee at national level. The Committee can have different titles like PMATF, DMATF and Community Executive Committee. Collaboration within the health sector and with other sectors- considerations of all options for collaboration within and between public and private sectors; strengthening channels of communication among policy makers and vector control partners.

Integration into the health system

Coordinating the IRS activities into the existing health system could result in more efficient use of resources and sustained support by other stakeholders. It is recognized that integration of IRS into the routine health services could derive great overall impact from health resources and systems:

- We need increased implementation of Indoor Residual Spraying-Twice per year .This has to be done in the period of October to December and February-to April. A double impact per year will yield good results. The selective spraying could fit well here.
- The Indoor Residual Spraying require changes in how services were delivered by district implementation levels (MOH, NGOs, CBOs & the private sector agencies. Existing or new health system inputs [Such as resources, time, money or expertise] may need to be allocated differently to support planning management, staffing, interpersonal communication or the measurement of integrated services.
- The Broader governance and capacity issues in the health system level: There has been need for new levels of coordination or joint planning of the policies, processes and infrastructure that make up a health system. Integration at this level often requires significant involvement and support from stakeholders, including donors, Ministry of Health, Policy Actor Ministries, advocacy groups, the private sector and NGOs.

- Strengthened intersect oral coordination: Cross-sector integration needs the health system to intersect for example with an education system to run IRS through schools and Agriculture program to address mosquito killing through spraying houses and controlling breeding areas through community engagement. This integration across sector requires engagement and commitment at multiple levels of agencies involved.

Monitoring and evaluation

A Monitoring toolkit has been put in place to guide the field monitors and the decision makers at every level. The tool kit or guide has to involve both government sectors, partners and other stakeholders. Its main purpose is to support Indoor Residual Spraying Program through systematic monitoring and evaluation of processes and outcomes allowing timely detection of gaps and constraints and so ensuring that adequate responses are triggered. The document has to assist vector control managers in their daily practice but also as background document for training and capacity building at all levels of the vector control program.

The recent research in the three target countries has shown that, if done correctly, IRS could be a very powerful in substantially reducing the vector population. New ideas, policy and institutional arrangements must be monitored and evaluated in order to ascertain the progress made and identify areas for further attention. There has been a need for checklist at National [pre-spray& Spray], Provincial level [Pre-spray & Spray] at district level [checklist for district operations]. RHCS to have similar checklist for preparations & implementation. There will be also checklist at village level [observation checklist: spray squads, interview acceptability of IRS, entomological surveillance mosquito and larvae collection forms, Bioassay test on IRS surfaces and susceptibility test on impregnated papers. The entomological surveillance has been monitoring such aspects. There has to be also self-evaluation form at national to look at preparation of IRS cycle at central level and IRS activities.

Reporting on progress and performance indicators: The NMEC has to receive records of data reporting on structures and populations covered on daily basis. There should be a desk to receive reports at each of the offices [National, Provinces, District, facility and community. By close of each day (18.00hrss) coverages have to be known and by the middle of the month provinces not doing well have to be followed by the supervisory teams either by way of phone communication or visiting them. In order to facilitate effective recording and reporting of information, clear and simple data collection forms, entry forms and analysis forms have to be provided.

Table 1: Framework for success factors, lessons learned and best practices for cholera out-break in Zambia.

Success factors	Lessons learned	Best Practices	Comment
<ul style="list-style-type: none"> -Ending cholera. A Global Road Map to 2030 -Ministry of Health [Ministerial Declaration to Ending cholera [Vision& Mission Statement] -Aligned MOH with cholera control structures -Development &Implementation of Statutory Instrument [S.I 79] -Clearly defined terms, roles and purposes of working teams starting with the Ministry of Health -Ministerial strategic focus &Operational efficiency <ul style="list-style-type: none"> -Identification of stakeholders -Community Engagement at all levels (User Involvement) -Availability of material Logistics: Funds, Medical Products, Transport, PPEs, Food, Human Resources [Technical &Community] <ul style="list-style-type: none"> -Defined the approach methodology: community participatory approach, IEC materials, guidelines, politics, tools &Job Aids were made available. -Management of disease surveillance data(IDSR) -The ongoing capacity building of staff, community(NHCs) and others relevant government sectors <ul style="list-style-type: none"> -Easy access to medical products for cholera control -Support senior leadership in the hierarchy 	<ul style="list-style-type: none"> -Minister worked with people, stakeholders &took responsibility to lead teams -Inclusion of the local government on public health as a delegated responsibility to Local Authorities <ul style="list-style-type: none"> -Support Field Assessments -Strengthened monitoring & supervision of activity implementation -Good division of roles among partners -Technical coordination of mechanisms for cholera control of commanded Thematic Working Groups co-chair arrangements -Establishment of multi- sectoral weekly briefing meetings at all levels -Ongoing identification of operational gaps by 	<ul style="list-style-type: none"> -Minister made decisions <ul style="list-style-type: none"> -Team Leadership -Establishment of community-based response mechanisms with councilors -Early identification of weak districts -Mapping hotspots -Printing of Guidelines -Transport distribution plan in place -Developing logistics management plan <ul style="list-style-type: none"> -Existence of communication plan with field teams -Engagement of Ministry of Education -Daily briefs from the field -Weekly monitoring of morbidity& Mortality rates <ul style="list-style-type: none"> -TORs given to teams for coordination mechanisms -Sharing of information on daily basis through meetings and distribution of daily epidemiological updates <ul style="list-style-type: none"> -Engagement of community and government institutions especially government line ministries -Engagement of civil society and private sector for vehicle &other logistical support provided by private sector companies -Partners to deploy field coordinators to support coordination & Supervision [Malaria Commanders] for social mobilization <ul style="list-style-type: none"> -Technical coordination of partners -Identification of hotspots &sharing with partners 	<ul style="list-style-type: none"> -Feedback to communities -Use of Inter Religious leadership to sensitize own people <ul style="list-style-type: none"> -Diverse utilization of communication media -Community complaints handling -Ministerial person handling of some hard issues -Partners looking for where to provide assistance <ul style="list-style-type: none"> -Army used where necessary -Staff reshuffles especially those not doing well <ul style="list-style-type: none"> -Area Councilors engagement -Different community plans developed - Effectiveness and efficiency in medical products was noticed with excellence it deserves

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-Commitment of resources [HR, Finance & mobility]	selected teams	-Province, district to national feedback mechanism	
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Source: Cholera Control and management reports (2017/2018)

Table 2: From your experience, how can we improve Indoor Residual Spraying Campaign program assuming that all logistics are in place and that implementation of the program can start at the right time.

Lusaka	Western	Central	N-Western	Northern	Luapula	Southern	Muchinga
<ul style="list-style-type: none"> -Engage community early and strengthen community partnership through community meetings, local media to address high refusals problem and misconception about IRS in all the districts. -Construction of an IRS base nearer to the district health office. -Procure and supply adequate spray pumps and repair kits. -Adequate funds to conduct mop up during the main spray campaign. -Adequate supply of PPE for spray operators. -Adequate funds at PHO for IRS campaign supervision 	<ul style="list-style-type: none"> -The right Time is a crucial point. Funds amongst logistics spare parts should be in place, funds received early, all Depend on releasing funds early. Program always start rain season. 	<ul style="list-style-type: none"> -Always start the actual spraying exercise before rain season -Empower spray operators by slightly increasing their daily wages -Increase the number of supervisors and monitors 	<ul style="list-style-type: none"> -Intensified supervision at all levels -Intensified community sensitization/ mobilization before, during and the campaign 	<ul style="list-style-type: none"> -Quality and Commitment of IRS by spray operators: The structures being left out as most of them do not come from the catchment areas where IRS is being implemented. Quality of Cascade and community mobilizers training -Weak Community mobilization -Quality of Supervision and monitoring 	<ul style="list-style-type: none"> -Involvement of Influential leaders at planning level and a well-coordinated community mobilization -We may also need to conduct a Human Centered Design approach to fully understand the community's desire with IRS. 	<ul style="list-style-type: none"> The program must be Localized by ensuring that spray operators are trained in zones in order not to miss structures as they are familiar with the area. 	<ul style="list-style-type: none"> -Decentralize IRS to be provincial specific taking into account the seasonality -Resources be sent to Provinces for effective monitoring of its utilization by districts (accountability)

Source: From Provincial Health & District Offices experiences

Table 3: Which thematic areas of Indoor Residual Spraying Campaign Program do you recommend to improve at each implementation level assuming all logistics and resources arrive at the right time and are in place in your province or districts.

Lusaka	Western	Central	N-Western	Northern	Luapula	Southern	Muchinga
<ul style="list-style-type: none"> - strengthened Social Mobilization activities -Regular Review of performance meetings of IRS campaign at Provincial Level at least one (1) during and two (2) after the campaign. 	<ul style="list-style-type: none"> -There should be specific vehicle for supervision of spray 	<ul style="list-style-type: none"> Not Answered 	<ul style="list-style-type: none"> Not answered 	<ul style="list-style-type: none"> -Sensitization at all levels -Occupational Health and safety- most of 	<ul style="list-style-type: none"> -Community Level (coordinated community mobilization and involvement of traditional leaders and other leaders in the community) 	<ul style="list-style-type: none"> The training of SO and Supervision; for the program to ran well the SO 	<ul style="list-style-type: none"> -District Level (Areas of high incidence



<p>-PHO supervisors to be involved in Training of Trainers for IRS</p> <p>-Adequate Monitoring and Supervision of IRS campaigns in the districts</p> <p>-Improvement of storage and disposal of IRS waste in all the districts.</p>	<p>operators....</p> <p>pool vehicles</p> <p>hinder effective supervision</p>			<p>the districts if Not all don't have change rooms for spray Operator and supervisors.</p> <p>-Weak Supervision and Monitoring</p>	<p>-Facility Level (all the staff should be involved in community mobilization)</p> <p>-District Level (involvement of all the stakeholders, sensitization through the media, drama in schools and market places)</p> <p>-Provincial Level (technical support and involvement of stakeholders at that level).</p>	<p>by increasing the number of days especially in application technics</p>	<p>be mapped through HMIS and vigorously plan and deal with those areas</p>
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Table 4: How do you think we can improve supervision to IRS implementation to districts and to field activities.

Lusaka	Western	Central	N-Western	Northern	Luapula	Southern	Muchinga
<p>-By allocating adequate funds at provincial level to conduct support supervision</p>	<p>-PHO to instruct DHDs to allocate a four wheel drive specific vehicle to IRS program. not pool vehicle.</p>	<p>By introducing team leaders and mobilisers to ensure reaching out to all households</p> <p>-We can effectively Improve supervision by assigning One supervisor to four spray operators, that is excluding the IRS Manager. Ratio of 1 : 4.</p>	<p>Supervision to be done on daily throughout the duration of the campaign</p>	<p>-Involvement of adequate number of EHTs as focal points with district supervisors & Community mobilisers to bridge the gap</p> <p>-Orient facility staff in IRS Campaign</p> <p>-Deploy motor Cycles, bicycles, boats & oxcarts etc.</p> <p>-Constitute a dedicated DHO Team for M&E during IRS campaign</p> <p>-Utilized community structures (NHCs, HACs, Chiefs, Headmen, Chas & RHC staff.</p> <p>-Motivation from DSA for the IRS period [30</p>	<p>-Supervision starts from training of which supervisors should show leadership and they should be given well defined and clear supervision tools, increasing the number of supervisors can improve the effectiveness of supervising but that should also come with improved coordination among supervisors and regular meetings for</p>	<p>-Provision of motor bikes to supervisors to enable move faster and be able to reach in hard to reach areas where vehicles can't reach.</p>	<p>-Provide adequate resources for provincial master trainers</p> <p>-Advocacy meetings from Provincial, district and chiefdom levels</p>



				days] and not for k85 because of laborious work done. Chilubi & Kasama have not been paid since 2014	feedback. -IRS managers must be trained together with Data Clerks and M&E officer to ensure they are at the same level.		
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Source: From Provincial Health & District Offices experiences

Table 5: How much have we engaged the community in implementing Indoor Residual Spraying in our provinces or district.

Lusaka	Western	Central	N- Western	Northern	Luapula	Southern	Muchinga
-By involving PHO Environmental Health Unit in entomological surveillance/survey.	No response From Western Province	The communities are engaged early before training commences, as well as during actual spraying. They are the ones that mobilize and inform the community members when the spraying will be conducted. During spraying, they take the spray operators round together with the supervisors in the communities.	All communities in all 11 districts are involved in community sensitization, traditional leaders, civic leaders, government departments, churches. Only of 11 districts, only 2 districts are supported by stakeholders that is Kansanshi mine, Kalumbila mine and Lumwana mine	Firstly, communities are involved in mobilization and sensitization on IRS key messages. During social and community mobilization that is when we try to involve them Though poorly done as well and without proper supervision. However, engagement of the communities during implementation of IRS activities has been very weak and poor.	The community has been engaged at pre-planning, planning and implementation stages. -The general picture at provincial level is that few involve communities During pre and planning. -With few districts within the province are able to involve the community at all stages. The best way of engaging the community is in IRS identifying the best working strategy for different community sitting.	-Stakeholders are involved in resource mobilization, community mobilization and program evaluation	-Superficially- usually they are not part of the planning and yet IRS must be community Driven.

Table 6: Which areas do you feel capacity has to build for effective Indoor Residual Spraying.

Lusaka	Western	Central	N-Western	Northern	Luapula	Southern	Muchinga
-Capacity Building of EHTs in Entomological Surveillance to fully understand the vector in their respective areas not only people at the National level.	-Supervision of Spray operators -Selection of spray operators we improve - Disbursement of funds from central level and spares improve. -Strictly target hot spots centers catchment areas.	-District Health Directors in most districts of Central Province are new and for effective implementation they need to be oriented in the running of the program. -Cascade trainings should be at least minimum of 14 days for spray operators to assimilate and perfect the skills of spraying. -For TOT, important to invite at least 3 people from the district (IRS Manager, IRS Coordinator and one new IRS supervisor).	-Supervision skills -Monitoring and Evaluation skills	-IRS management -Logistics management -Spraying techniques and insecticides formulations -Monitoring and supervision of Spray Operators -Social community mobilization and community engagement by DHO staff and RHC staff. -Train community volunteers and CHAs on how to conduct door to door visitations -Local Leadership sensitization/awareness meeting during full council meetings for councilors, chiefs and headmen on Presentations on analyzed disease burden and the processes starting from recruitment process to evaluation. -HAC at Health Facility - Roles and Responsibilities before, during and after the campaign. How Malaria data at facility level should be discussed zone by zone and the key high impact interventions. -We need to train community volunteers in mobilization.	-Effective Team leader training -Effective supervision tools -Effective training of all carders with the required skills -Will coordinated community mobilization	Monitoring and Supervision	-District and Health facility levels on implementation -Provincial supervisory role

Southern: From Provincial Health & District Offices experiences

Table 7: How has been the collaboration in IRS implementation within the health sector and other sectors in our provinces and districts.

Lusaka	Western	Central	N-Western	Northern	Luapula	Southern	Muchinga
-Poor collaboration between Health Office and other stakeholders at PHO and DHO Level.	Collaboration has been good. We can always improve more	-Its on the fair side, but sectors like ZESCO so supportive in Itezhi- tezhi, ZAWA as well , the DC's office and the radio White farmers in Mkushi have also been so supportive in supporting the program by spraying in the farm block. -World Vision in Mumbwa has also been supportive by supplementing on the resources such as fuel and transport.	good	-The rest of the sectors such as Local Authority etc. are very passive -Others mainly think that it is the duty of the Ministry Of Health and less support from other sectors if anything they want to be paid allowances as well. -There has been a bit of a change with the introduction of Malaria Task Forces at least we are seeing some collaboration through the DCs office.	Good	-It has been good but we need to do more i n stakeholder collaboration s at local level	Inadequate, We only need them at the end during implementation. We don't engage them during planning. There is need to use the college approach in order to increase acceptance among learned colleagues

Source: Provincial Health & District Offices experiences

Table 8: How far has our advocacy on social mobilization and resource mobilization being organized with local leaders, implementers and communities and other stake holders (Business Community).

Lusaka	Western	Central	N-Western	Northern	Luapula	Southern	Muchinga
-Social and resource mobilization adequately done only during IRS implementation not afterwards. Inadequate National	Fairly good on going.	-In Itezhi-tezhi Social mobilization is always done through the radio and visiting our chiefdoms to sensitize them on the exercise but fan enough for resource mobilization its just ZESCO that are helping us with the storage and ZAWA transport, tractor especially during rainy season. -The local	-Its limited only to the period during IRS implementation	-Advocacy is more with human resource only and not financial resource and this hampers effective mobilization owing to long distances mobilizers have to cover due to inadequate resources to recruit and train more community mobilizers. Advocacy with stake holders still is a challenge, officers think of monetary gain when called for meetings and or monitoring. MOE is one ministry that needs to be on board. The area of advocacy with the business community is one area not fully explored and need attention. Strategies on how to bring them on board e.g. meetings should be utilized. -Local leaders are not fully utilized in the implementation process more when it comes to refusals. The teams rarely visit the headmen	-Not very impressive (more energy and time should be invested in this area)	-We have not exploited much however the process is still on going.	-Very low, the issue is never brought to round table for discussion so that planning can be done together.



SUNTEXT REVIEWS

<p>Malaria Week activities in the Province.</p>		<p>authorities have provided storage facilities in most districts and other partners have offered transport especially through the District Administration.</p>		<p>during implementation and after the day's work. The community on the other hand has been involved in mobilization and implementation but contribution to allow for community ownership and sustainable development. This has been a poorly done the office of the health promotion officers has not been actively involved in IRS community mobilization as well as .-At times districts have been using already existing structures at health facilities such malaria task forces, NHCs and other community structures.</p>			
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Source: Provincial Health & District Offices experiences

Table 9: Have we ever conducted an operational research/assessment/survey for IRS Campaign in our province/districts? If any what were our findings and recommendations to that effect.

Lusaka	Western	Central	N-Western	Northern	Cupula	Southern	Mooching
<p>-No operational research/ assessment/ or survey for IRS has ever been done in Lusaka Province to the best knowledge of PHO.</p>	<p>-Yes as an academic paper. Findings revealed: -Many houses were missed not sprayed likely some spray operators not doing job well. -Supervision was not very good. -Rains affected spraying on certain days prolonging spraying days -IRS was effective in malaria control -People welcomed the program.</p>	<p>-In Itezhi-tezhi Social mobilization is always done through the radio and visiting our chiefdoms to sensitize them on the exercise but fan enough for resource mobilization its just ZESCO that are helping us with the storage and ZAWA transport, tractor especially during rain season. -The local authorities have provided storage facilities in most</p>	<p>No</p>	<p>Not yet however, some districts such as Chilubi conducted one this year on acceptability of IRS in urban community. It revealed that urban community recorded low acceptability of IRS and difference reasons were explained. Mporokoso also did structure verification and assessment and findings were that there more structures left unsprayed due to long distances and most of these structures are scattered. Many of these structures were not even mobilized. Recommendations to this effect were to increase community mobilizers, increase spray operators and</p>	<p>-No (most of the time pl astic surveys are done and not well defined ones)</p>	<p>-Yes; we did an operational entomological survey on t therefore meant that some chemicals well while others did not do a good job</p>	<p>-Low IRS acceptance in urban parts of the districts -Centralized operational management increases the cost of doing the Program</p>



		districts and other partners have offered transport especially through the District Administration.		increase spray period to ensure all areas are sprayed effectively. Also making sure that if all villages were to be sprayed, all headmen should be involved for ownership.			
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Table 10: What can make us fail in Indoor Residual Spraying campaign as a Province or District.

Lusaka	Western	Central	N-Western	Northern	Luapula	Southern	Muchinga
<ul style="list-style-type: none"> -Late IRS implementation on -Non engagement of key stakeholders in IRS implementation -Late delivery of IRS logistics -Poor social mobilization 	<p>The following may make us fail</p> <ul style="list-style-type: none"> -Starting program when rains have started in the middle of rain season -Late receiving of implementation funds -Poor selection of spray operators if we do not do on merit houses will be missed and if supervision 	<p>In Itezhi-tezhi Social mobilization is always done through the radio and visiting our chiefdoms to sensitize them on the exercise but fan enough for resource mobilization its just ZESCO that are helping us with the storage and ZAWA transport, tractor especially during rainy season.</p> <p>The local authorities have provided storage facilities in most districts and other partners have offered transport especially throu District Administration.</p>	<ul style="list-style-type: none"> -Lack of logistics -Inadequate or lack of supervision at all levels -Lack of community involvement 	<ul style="list-style-type: none"> -Poor transport system & Failure by IRS managers to analyze and evaluate the program -Lack of commitment and dedication in short ownership of the program -None engagement of the community and traditional leadership -Inadequate monitoring and supervision of SOPs. -Inadequate social and community mobilization -Absence of publicity and sensitization on IRS. Implementation of IRS activity during intensive phase of rain season -Inadequate coordination of the program by responsible officers. -Late delivery or at times insufficient logistical and supplies due to the CSO population data used for planning purposes. 	<ul style="list-style-type: none"> -If, we don't involve influential leaders from the beginning and the issue is that as we involve these leaders we should move with an open-minded approach. 	<ul style="list-style-type: none"> -The quality of SO training, equipment (sprayers) and quality of supervision 	<ul style="list-style-type: none"> -If program is centrally managed instead of allowing districts to plan for its implementation -If program has no connotation of responsibility to EH staff



				-None involvement of stake holders -Inadequate planning			
Source: Provincial Health & District Offices experiences							

Table 11: From your experience colleagues how can we improve Indoor Residual Spraying Campaign program assuming that all logistics are in place and that implementation of the program can start at the right time.

Partners-1	Partner-2	Partner-3
-Commitment from every stakeholder involved. The biggest issue in IRS apart from resources is commitment by supervisors. They need to have passion for the program	-Engage community leaders and their subordinates. -Advocate for more cascade training days. -Entomological survey results to guide the type of spraying to be done in a particular area i.e. IRS or Overhead. -Construct standard IRS centres in all districts with proper change and store rooms. -Capacity build all supervisors -Conducting operational research studies would be of help in the program analysis.	-Adequate political commitment and social acceptance of IRS; Adequate information on local vectors, especially insecticide susceptibility status and indoor versus outdoor feeding and resting behaviors;
Source: Partner consultation		

Table 12: Which thematic areas of Indoor Residual Spraying Campaign Program do you recommend to improve at each implementation level assuming all logistics and resources arrive at the right time and are in place in your province or districts.

Partner-1	Partner-2	Partner-3
		-Adequate and sustainable financial, logistical and human resources; and an IVM platform, which is also relevant for insecticide-resistance management where insecticides with different modes of action can be rotated to reduce selection for resistance
<u>Community Level</u> -Quality of spray by SOPs. -Understanding by the community that this intervention requires both individual and community effort. The community need to know that for IRS to be effective and for them as individual households to be protected, they need to know that their neighbor too need to open up their houses.	-Social and resource mobilization	



<ul style="list-style-type: none"> -Quality of supervision by district staff. -Effective engagement of the community by community mobilizers. 		
<ul style="list-style-type: none"> -Quality of supervision by district staff. -Effective engagement of the community by community mobilizers. <p style="text-align: center;">Facility Level</p> <ul style="list-style-type: none"> -Accurate quantification of the number of structures and their distribution. -Leading examples to communities by ensuring that their own houses are sprayed. -Incorporating the importance of IRS and the need for the community to accept the intervention during public sessions at facilities e.g. during child health week and pre/ante natal visits. <p>District Level</p> <ul style="list-style-type: none"> -Monitoring of the program to ensure that the right things are being done. The DHDs must carry the vision and own the program. -Bring the district stakeholders on board through MATFs. In other words, it is not just meetings and it ends there, but it should involve actual contributions in kind and monetary if that is possible. <p>Provincial Level</p> <ul style="list-style-type: none"> -Monitoring of the districts through weekly reporting by the districts. -Frequent field visits to the districts. <p>National Level</p> <ul style="list-style-type: none"> -Monitoring of the districts through weekly reporting by the districts. -Occasional field visits to ascertain happens on the ground. 	<ul style="list-style-type: none"> -Community engagement -Advocacy meetings (stake holders meetings) <p style="text-align: center;">-Storage facilities</p> <ul style="list-style-type: none"> -Evaporation tanks/ soak pits -Construction of standard IRS Centers at district level. 	<p>Availability of all the necessary resources at the right time and place</p>
<p>Source: Partners for malaria elimination consultation</p>		



Table 13: How do you think we can improve supervision to IRS implementation to districts and to field activities.

Partner-1	Partner-1	Partner-3
<ul style="list-style-type: none"> -Enhance by the districts. The intervention should not be seen as donor driven. -Supervision should not be remote/under autopilot. Instead supervisors must be with the field teams. -Engage dedicated staff who have passion. Under performers should be beckoned 	<ul style="list-style-type: none"> -Enumerate supervisors according to stipulated government conditions i.e. ---Give a subsistence/lunch allowance where it is due and not bow down to partners' conditions which are not favorable at times. (compare the K100 camping allowance given to the supervisors to a K700 night allowance) -Provide adequate transport for supervisors in the field. Capacity build supervisors Emphasize on comprehensive local monitoring. 	<ul style="list-style-type: none"> -Reassessment of existing supervisors, their knowledge and suitability for the program. -Timeous, appropriate and adequate retraining and training of supervisors and spray operators. -Stringent and monitoring and supervision to include: <ul style="list-style-type: none"> *Use and accountability of insecticide * Evaluation of coverage * evaluation of client satisfaction * Follow up entomological activity (bioassay evaluations)-re monitor quality of spray operations.

Source: Partners for malaria elimination consultation

Table 14: How much have we engaged the community in implementing Indoor Residual Spraying in our provinces or districts.

Partner-1	Partner-2	Partner-3
<ul style="list-style-type: none"> -Mobilizers have been trained and engaged in door to door mobilization of the communities. -SOPs have been drawn from the community. 	<ul style="list-style-type: none"> -50% logistics were not disbursed in time due to inadequate community engagement 	Not Applicable

Source: Partners for malaria elimination consultation

Table 15: Which areas do you feel capacity has to be built for effective Indoor Residual Spraying.

Partner-1	Partner-2	Partner-3
<ul style="list-style-type: none"> - Supervision -Data interpretation 	<ul style="list-style-type: none"> -I feel capacity should be built to CHWs/MCA unlike the temporal ones engaged on contract basis who are just interested in money and not to fulfill the program objective. -Community members involvement -Through effective community engagement strategies. 	Adequate program and health system capacity to deliver good-quality, well-timed and high coverage IRS;

Source: Partners for malaria elimination consultation



Table 16: How has been the collaboration in IRS implementation within the health sector and other sectors in our provinces and districts.

Partner-1	Partner-2	Partner-3
-It has not been effective looking at the fact that other sectors do not actively get involved in IRS implementation.	Business community in Gwembe in southern province is small (only small fishing camps exist)	Not sure
Source: Partners for malaria elimination consultation		

Table 17: How far has our advocacy on social mobilization and resource mobilization being organized with local leaders, implementers and communities and other stake holders (Business Community)?

Partner-1	Partner-2	Partner-3
-A lot has been done to engage the following and talking points have been developed: <ul style="list-style-type: none"> . Traditional leaders . Religious leaders . Not much has been done to engage other stakeholders. . No much success so far on resource mobilization outside the usual GRZ and partner resources.	<i>Business community in Gwembe is small (only small fishing camps exist)</i>	There was no response from HEDC on this part as the organization is from outside Zambia though operation in Zambia under social marketing
Source: Partners for malaria elimination consultation		

Table 18: Have we ever conducted an operational research/assessment/survey for IRS Campaign in our province/districts? If any what were our findings and recommendations to that effect.

Partner-1	Partner-2	Partner-3
No response given	<p>-Not really a research but a comparison done on the traditional IRS that we have been doing over time to the facility based. (tried in Sinafala)</p> <p>-Traditional IRS : the one where all sprayer operators start at the same time and moving from one catchment to the other as a group is to involving and does not yield a desirable coverage.</p> <p>- Facility based: this is a strategy where a group of sprayer operators is used to spray the whole catchment of a particular facility for a specific number of days.</p> <p style="text-align: center;"><u>Recommendations</u></p> <p>-Consider decentralization of spray teams ie from one district team to various facility teams of 5 sprayer operators per team.</p> <ul style="list-style-type: none"> -Increase the number of sprayer operators -Increase the number of sprayers per district <p>-We need to add value to the program by improving amenities attached to it.</p> <p>-Engage CBVs (CHWs/ MCA) as sprayer operators for the sake of objectivity and sustainability of the program. (in defense not all CBVs are above the recommended age limit for participation in spraying)</p>	No response given



Source: Partners for malaria elimination consultation

Table 19: What can make us fail in Indoor Residual Spraying campaign as a Province or District.

Partner-1	Partner-2	Partner-3
-Inadequate supervision, inadequate leadership, lack of vision	-If the component of supervisor enumeration is not attended to. -If logistics keep coming in bits and not in the required amounts. -If we continue implementing it in the same traditional way. -If we continue spraying during the rain season	- Identify relevant stakeholders and involve them from the onset -Coordinated program implementation with all stakeholders (I.e. PMI(ABT/Vector link), MACEPA, NMEC, and Private Sector etc.)

Source: Partners for malaria elimination consultation

Table 20: Indicators of process and outcome for monitoring and evaluating progress in each component of integrated malaria vector control [21].

Capacity	Process Indicator	Type of data	Outcome	Type of data
Policy	-Focal point person for malaria vector control -Identified situational analysis completed -Economic impact for malaria vector borne disease assessed	L L L	-National malaria vector control policy in place -National policy on pesticide policy in place	L L
Institutional Framework	-Mandate & composition of national steering committee on malaria vector(IRS) developed -Terms of Reference for national coordinating Unit on vector control developed	L L	-National Steering Committee on malaria vector control IRS in place -National Coordinating Unit on vector control in place	L L
Organization & Management	-Task Force constituted to revise job descriptions & operating procedures -Task Force Constituted to develop professional standards on vector control and public health entomology	L L	-Number & percentage targeted staff with job descriptions that make reference to vector control and public health entomology in place	L
Planning & Implementation	-Required resources for implementation of malaria vector control IRS costed and	D	-National strategic and implementation plan on malaria vector control IRS in place	L

Citation: Kooma EH, Cheelo M, Chisanga A, Chifwesa A, Wakunuma T, Nyirenda C, et al. (2020). Improving Indoor Residual Spraying for Malaria Elimination: Emulating Success Factors, Lessons Learnt and Best Practices from Cholera Out-Break in Zambia. SunText Rev Med Clin Res 1(1): 107.



	<p>mobilized</p> <ul style="list-style-type: none"> -Required staffing level &competences for malaria vector control IRS identified -Epidemiological data disseminated &utilized by program for decision making &impact evaluation -Institutions to carry out operational research identified -Technical Assistance provided to programs to utilize results of operational research 	<p>D</p> <p>D</p> <p>D</p> <p>D</p>	<ul style="list-style-type: none"> -Number and percentage of targeted staff trained on malaria vector control-IRS -Epidemiological surveillance system on vector-borne diseases in place -Number of targeted sentinel sites with functional vector surveillance and insecticide resistance monitoring -Number of operational research priorities on vector control the have been addressed -Number of operational research outcomes on vector control that have been utilized by implementation program 	<p>L</p> <p>L</p> <p>L</p> <p>N</p>
Advocacy &Communication	<ul style="list-style-type: none"> -Advocacy materials prepared; case studies conducted &documented -Major stakeholders have identified the requirements for vector control -Targets set for number of villages to receive campaigns on behavioral change on vector control; resources allocated and persons trained -Guidance given to villages on organizing and planning of vector activity 	<p>L</p> <p>L</p> <p>L</p> <p>D</p>	<ul style="list-style-type: none"> -Advocacy meetings on malaria vector control IRS in place -Number of targeted villages received campaigns on behavioral change on vector control -Number of targeted villages where communities have mobilized on vector control 	<p>N</p> <p>N</p> <p>N</p>
Capacity Building	<p>Curricula developed for each required competence; Institutions for training and certification identified</p>	<p>D</p>	<p>Certified training courses on malaria vector control(IRS)&Judicious use of pesticides in place at national and regional level</p>	<p>L</p>
<p>Key: L, Logical data (Yes/No); D, Descriptive data; N, Numerical data</p>				

Table 21: Module of the structure for training on IRS by weight given to each module by target group and Period [22].

Module	Weight (%)	Target Group				
Group		Community Specialist	non	Village or district Specialist	Public Health Professionals	Academic Students



Introduction to vectors of human disease0	15	+	+	+	+
Planning& organization	30	+	+	+	+
Organization& Management	20	-	+	+	+
Policy& Institutional Framework	10	-	-	+	+
Advocacy &Communication	10		+	+	+
Monitoring Evaluation	15	+	+	+	+
Estimated duration(days)		+ 4-8	+ 6-8	+ 8-10	+ Above 15
Not required; plus, minus partly required; +required 0 not in the handbook					

Table 22: Functions and Competencies Expected of Partners Indoor Residual Spraying.

Level	Function	Type of Competence
National, subnational	-Advocacy -Set strategic direction and conduct overall evaluation -Advise on policy and institutional arrangements -Conduct epidemiological &vector assessment, stratifying -Supervise decentralized organization and management -Prepare curriculum and Train Trainers -Coordination of Emergency Response -Advise on research problems	-Access and communication -Planning and evaluation -Policy analysis -Technical knowledge -Facilitation, Technical knowledge -Training -Management, Technical Knowledge -Technical Knowledge
District, Village	-Advocacy -Establish Inter sectoral partnerships and net working -Plan &implement local IVM strategy -Monitor &evaluate -Organize & Manage -Conduct local vector surveillance -Train, educate and raise awareness	-Access &communication -Access and communication -Analysis & decision making -Operational -Management -Training &communication

The attitude of the community towards IRS can be assessed through community knowledge, attitude, behaviour and practice surveys: The surveys have to be conducted and information has to be collected during spraying campaign include community acceptance, or reasons for not accepting the spraying, locking rooms or plastering of walls or sprayed rooms. The information could guide the development of educational messages to improve IRS Program performance.

Indoor Residual Spraying operational reviews to be undertaken at end of each spray campaign season to determine whether all aspects of the operation have been carried out as planned: Hold comprehensive annual review meetings 1-2 months after spray round has been completed to review the overall Indoor Residual Spraying Operation to ensure program target and objectives have been achieved and to outline adjustments and improvements for the next year's operation. Reports have to be prepared by District and Provincial IRS Coordinators. The Technical Working Group (TWG) for vector control to meet to review the performance of provinces and districts and provide a feedback to partners meeting for Vector control. This will help to identify trends and strengths and weaknesses that could be instrumental in making decisions about future expansion of interventions or reduction of target areas and objectives.

Operational research: At this point there has been a need to identify operational research areas. Indoor Residual Spraying must be guided by research in order to strengthen the evidence base for decision making. Opportunities should be taken to build capacity for operational research within Indoor Residual Spraying. Strong desire for research help target key problems in the field, thus increasing applicability and use of research findings. Operational research conducted within the program will help ensure shared use of human and logistic resources. The link with research institutions is very important at all costs.

International cooperation: Cross Border Malaria Initiative (CBMI) - International or regional cooperation has been found to be useful for sharing expertise and accessing research findings. For example, through the African Net Work on Vector Control resistance to insecticides, capacity for resistance monitoring has been strengthened and results shared. Existing networks could be expanded to share the local evidence base for decision making, for example for vector identification, ecology and behaviour. Cooperation and networking can be done through existing regional networks through new international networks. It is important to synchronize Vector control programs through harmonized policies of each country.

Cross-Border collaboration between countries in the elimination phase and those in the control phase is more challenging than between countries in the same phase. This because the strategies

and priorities of the two phases of the programs differ. Monitoring must be supported by a formal system with the capacity and mechanism to foster collaboration in cross-border vector control. This will be in addition to strict passive and active case detection and radical treatment of all imported cases in border areas to mitigate the malaria transmission. It is unlikely that countries in the malaria elimination more can achieve or sustain zero levels of local transmission unless they ensure a significant and sustained reduction in malaria transmission in the border areas neighbouring countries in the control phase. There should be a full coordinated and strong CBMI and a need to share information and harmonization of vector control strategies including synchronization of interventions.

Vector surveillance: During and after IRS to determine target interventions of malaria elimination and monitor the impact of interventions. Implementation of interventions of malaria elimination needs more precision than the control phase because the aim has been to completely eliminate existing pockets of transmission risk. Vector surveillance has been found to guide the target interventions in specific foci. Monitoring of vector bionomics including abundance, feeding and resisting behaviours and insecticide resistance is pertinent.

Strengthening the system, capacity and establishing functional vector surveillance systems are critical, when IRS is implemented for malaria elimination. The challenge has been vector abundance declines enormously as malaria elimination program progresses to the elimination phase. This makes the measurement more important entomological identification extremely difficult owing to the low levels of vector mosquitoes to be found in the environment. This direct assessment of the quality to interventions through bioassay tests and measuring of larval and adult tests and measuring of larval and adult vector densities is very essential.

Monitoring implementation of vector control measures

It has been highly desirable to routinely assess through sustained vector surveillance the impact of IRS campaign in achieving objectives of eliminating local disease transmission and reducing the risk of its re-introduction. After an IRS Campaign, bioassays must be conducted monthly during the expected effective residual life of the insecticide applied (Table 20).

Cross-border malaria initiative: Zambia and bordering countries in the control phase need to collaborate in the elimination phase and prioritize areas bordering those countries in vector control measures. In situation where such areas are not the priority for the country in the control phase, the country in the elimination could support implementation of vector control interventions a cross - border (SADC Guidelines, ECOWAS & IGADI). Evolving from malaria control to elimination does not



entail changing the entire vector control strategy and interventions but just the focus and intensity of malaria control strategies already in place.

Stratification of malaria epidemiology in elimination:

Stratification refer to the classification of disease endemic areas by their epidemiological and ecological characteristics. It has been the dynamic process of identifying the areas to which interventions must be targeted to tackle residual and new focus transmission. A foci in malaria elimination phase could be classified into six types: endemic, new potential, new active. Residual active, residual non-active and cleared up [10]. It has been found that as malaria transmission is interrupted in various localities in the process towards its elimination nationally, the type and distribution of foci well can change continuously. There is need to continuously stratify and micro stratifying malaria epidemiology. Stratifying has been found critical in targeting vector control interventions. Stratification can range from basic to very complex. In its form stratification has been conducted to differentiate between areas with different incidence rates of a disease within the country, in relation to population census data. WHO Global malaria program uses stratification to differentiate provinces or districts according to four levels of malaria endemicity: with 100, 1-100, less 1 and 0 cases per 1000 population per year. Overlay maps of individual malaria vector disease assist in identifying areas in which more than one disease occurs.

Mobilization of resources [Health sector, public sector& private sector]

Financial Resources from the health sector: The available resources must be used to transform a conventional system of malaria vector control. The new capacities, structures and activities of IRS require start-funds for their establishment and recurrent funds for maintenance. Some funds can be available from the monthly grant and further fund could be provided by the other public sectors and the private sector or by external donors. The Zambia government must contribute tremendously to IRS rather than relying on donor money assistance to ensure national stewardship and the sustainability approach. Indoor Residual Spraying must be seen as one of the strategies for strengthening health systems, not as a separate program with a separate budget line. Let funds earmarked to support local health systems become available for IRS as part of a strategy to increase efficiency of overall disease control. Indoor Residual Spraying must benefit the health system, government and society in several ways. Integrating the resources into one strategy can result in cost saving measures, for example by combined interventions and joint monitoring and evaluation. The reach of other health services might be extended by combining them with IRS activities at community level, also contributing to more efficient

use of resources. IRS could also benefit the health system by increasing the status and motivation of health staff, improving their analytical and decision making abilities and partnerships with other sectors [11-15].

Financial resources from the public Sector: What has been found to stimulate other funders from the public sector is the vector control policy framework availability at national level and evidence of the importance of vector control or preventive measures to each sector through health impact assessments. The ministries that might be involved in generating funds for IRS in their own sectors are those of finance, agriculture, environment, local government, commerce, Road Development Agency and tourism. Civil society organizations, including international and non- government organizations could also collaborate in generating funds for Indoor Residual Spraying [16].

Financial resources from the private sector: The business zones, tourist areas, mining industries, Zambia Sugar, civil society, faith based.

Planning and the implementation of indoor residual spraying:

The epidemiological and vector control situation of the country, province and district including communities, assessment of requirement pre-spray, during spray and post spray have to be known. Assessment of requirements and resources and preparation of locally appropriate implementation strategies have to be discussed prior to start of Indoor Residual spraying. The steering committee has to sit and share the type of resource needs. Various constructive decisions must be made in planning for IRS such timing, targets, mapping, methods, funding for especially supervision, management of resources and stakeholder participation at all levels. Planning involves continuous adaptation of management choices to a heterogeneous and ever-changing environment. Making decisions on any of these issues requires valid, accurate, locally specific information that is accessible to all parties involved. There is a need to involve all partners at every level in analysing the local situation, selecting options and assessing requirements [17-20].

Entities involved in implementation: Partners to play a big role in implementing IRS have to be known by the steering committee. The activities could involve promotion messages, awareness-raising, social marketing, distribution of spray teams. Nonetheless, other partners, such as communities, schools, the private sector and public sectors have important roles in planning and implementing IRS.

Entities responsible for implementation: Partners have to be fully involved and allocated areas that they are to be responsible. Government offices other than health can and should however share responsibility for some activities. The involvement of multiple stakeholders in IRS require a functional organizational structure for effective coordination of activities, to ensure that the joint efforts are consistent and have common goals. The local



organizational structure at district and rural health centre should have broad participation of stakeholders including community members.

Entities responsible for monitoring and evaluation: Local partners should monitor and evaluate the implementation and maintenance of their activities to identify shortcomings and suggest remedial action. Monitoring and evaluation conducted by an external agency (government and nongovernmental) is likely to increase accountability for IRS and help to ensure unbiased results [21,22].

Advocacy and communication: Indoor Residual Spraying must be communicated effectively at all levels to ensure its adoption, to foster collaboration and networking among partners and to empower communities. The targets of advocacy are policy-makers (Minister of Health & Other Policy Actors, Ministry of Traditional Affairs including Members of Parliament) with key messages. During transition and consolidation of IRS strategy, continued advocacy and feedback on the performance and impact of IRS will be required to ensure sustained allocation of resources and to expand the strategy to new areas. Staff in the public and private sectors and in civil society organizations will be expected to implement and sustain Indoor Residual Spraying campaign. A school debate motion for Indoor Residual Spraying has to be suggested for campaign season. Communication with the general public creates awareness, drives behavioural change and empowers people to become involved in analysis and decision-making and adopt practices for indoor residual spraying. Tools for reaching the general public for IRS should be village meetings, debates in schools include the media and educational interventions to increase knowledge and skills. To put IRS on the national agenda, advocacy is needed to present it as a cost-saving and more effective system of vector control. Associating the benefits of IRS with broader developmental issues, such as strengthening health systems and empowering communities, could increase support. The anticipated result is that political leaders raise malaria vector control on the national agenda, shape policy agendas to promote IRS and communicate the policy change direction to public sectors, health professionals, researchers, civil society organizations and communities. Each year message development will be tailor made to gaps identified after each spray campaign. Continued advocacy for IRS is particularly critical at this time, in order to avoid “fatigue” among the players. In these situations, malaria may no longer be a public health concern but the management of vector populations must be sustained, because low vector populations will reduce the risks for resurgence or reintroduction of disease. Continued investment in IRS is justified, even after elimination, by the very real risks for disease resurgence when prevention efforts are relaxed. One way to ensure continued support is to measure the cost effectiveness of an investment in terms of the disease burden that is prevented

after successful elimination. To make the case for IRS, advocacy must be based on strong evidence, as policy- and decision-makers must be convinced of the benefits of IRS before giving it their full support and high priority in allocation of resources. They will ask:

Why should I support IRS

Politicians are bound to have reservations about changing the existing malaria vector control system, and they have to know how investment in malaria vector control will pay off in terms of health, social and economic benefits and whether IRS can be sustained financially. Purposeful analysis of the available evidence and effective use of advocacy are essential. Advocacy could be through person-to-person communications and forum meetings with visual presentations to the public at grass root levels [23-27].

Preparing an advocacy strategy

To persuade government policy- and decision-makers to endorse malaria vector control, a strategy for advocacy is needed, with a clear vision and a feasible plan. The following steps are suggested for Indoor Residual Spraying Campaign:

- Establish a working group at national level.
- Collect data on the burden of malaria
- Analyse the situation to identify problems in the current system of malaria vector control (e.g. lack of evidence-based decision-making, lack of capacity, lack of monitoring and feedback, poor integration with the health system, detection of resistance to insecticides).
- Define a clear position and the expected outcomes of using integrated malaria vector control.
- Set timelines and milestones.
- Identify the target audience.
- Prepare messages and other advocacy tools.
- Acquire the skills and practice needed for strategic advocacy.
- Plan activities (e.g. interpersonal communication, forums, alliance building).
- Evaluate the implementation and results of the strategy.

Communication and empowerment

To create an enabling environment for IRS at community level, people implementing malaria vector control strategy should be aware of any sociocultural barriers, so that all opportunities can be best used. The challenges are: changing human behaviour to reduce vector biting and disease transmission, increasing compliance with interventions and motivation for vector control activities and removing misperceptions and misguided methods of vector control. It is important to provide access to information and services on malaria and ensure mutual interaction and communication. The main challenges are to improve access to

information and services and to change behaviour. Interventions designed to remove sociocultural barriers generally focus on increasing the knowledge and skills of the general public by giving them better access to information and services. This should lead to a change in behaviour and in activities that will reduce vector-borne diseases. Information and awareness campaigns do not, however, always result in new or modified behaviour. Many risk factors for malaria are within people's sphere of influence, which is the peri-domestic environment. Public services cannot easily reach this environment, and communities must take control and assume responsibility. Clearing roof gutters in order to control dengue vectors, for example, should be the responsibility of household members rather than of health teams [28].

People must therefore be "empowered", not just to be aware of the risks but to take appropriate action of self-protection and vector control when and where needed. Empowerment means that people take more control over their lives. People need empowerment in areas in which they themselves can contribute to improving their situation, with less reliance on scarce external services such as the health sector. Empowerment occurs only when two basic conditions are met. First, the necessary means or enabling factors must be in place: challenges, responsibilities, opportunities, resources and capabilities must be used to achieve empowerment. Secondly, a process of analysis and decision-making for subsequent action must be accepted and followed. While the "means" refers to capacity- building and a group approach, the "process" refers to active involvement in the planning and implementation of IRS at local level. Numerous tools have to be used: the media; information, education and communication; communication for behavioural impact. The approach begins with an analysis of the situation to determine behavioural barriers [Low acceptance rate, absenteeism] and constraints in a certain group. A significant purpose of communication for behavioural impact is to ensure that effective methods are effectively used at community level. Integrated malaria vector management strategies could benefit from the rich experience in school debates integrated field-based education during weekly school meetings and special meetings. Information, education and communication programs have had positive effects on knowledge and attitudes, but concern has been expressed about the slow pace of achievements and the lack of documented behavioural impact of this approach. People might understand the behaviour needed to reduce a health risk but fail to act accordingly. Communication for behavioural impact requires considerable effort for specific outputs, but the results suggest that it affects people's behaviour. Both, information, education and communication and communication for behavioural impact are designed for situations in which the messages are general applicable in targeted areas. Farmer field schools are designed to

help people design locally appropriate methods or solutions and are applicable in complex, changing settings [29].

Monitoring and evaluation

Progress in advocacy and communication must be monitored and evaluated to identify areas for further attention. Process indicators such as: Advocacy materials prepared; case studies, Advocacy meetings on IRS in place conducted and documented, Major stakeholders have identified the requirements, Number (and percentage) of targeted stakeholders that for IRS have allocated resources for vector control, Targets set for the number of villages to receive IRS, Number (and percentage) of targeted villages that campaigns on behavioural change on IRS acceptance and availability; Received campaigns on behavioural change on IRS resources allocated and persons trained, control Guidance given to villages on organizing and Number (and percentage) of targeted villages where planning of IRS activities, communities have been mobilized on IRS activities.

Capacity-building: Capacity-building has been a significant challenge in implementing an IRS strategy. The strategy depends heavily on the knowledge and skills of people in functions at national, subnational, district and village level/community level. In this section, ways of developing the appropriate knowledge, skills and infrastructure are discussed.

Learning environment: The development of human resources requires a supportive environment, with political and financial commitment for training, recruitment and career paths. Substantial investment in training courses will be required to upgrade and maintain the knowledge and skills of people involved in an IRS strategy. The IRS approach itself provides a supportive environment for learning, as it is a problem-solving approach to mosquito population, in which analysis and decision-making are central and participation is vital. Observation, analysis and decision-making are the ingredients of a learning cycle, which stimulates continued learning by interacting participants. This results in an environment that is conducive to learning and development. Hence, once an IRS strategy is operational, it could serve as a self-enforcing mechanism of generating knowledge and skills.

Core functions and required competence

The planning and implementation of IRS require appropriate knowledge and skills for management, analysis, problem-solving, communication and facilitation. Human resource development begins with an assessment of the current competence of all relevant personnel in order to identify the requirements for others.

National and subnational level

At national level, an IRS strategy requires a high-level Inter sectoral Steering Committee, as mentioned previously.

Specialized partners and technical working groups could work under the guidance of the steering committee, for example on the components of evidence-based decision-making, capacity-building and monitoring and evaluation. The teams and working groups should include people with competence in epidemiology, entomology, malaria disease control and elimination and program management. This competence is often available in existing systems but might require reorientation or strengthening to address Indoor Residual Spraying. The functions and essential competence of malaria vector control partners at national and subnational level are listed in Table below an important function at national level, apart from providing direction and advice, is facilitating activities at lower levels of administration and implementation, requiring facilitation skills. Advocacy is a growing responsibility of health professionals and program managers, and the skills and experience for such active communication strategies should be strengthened in most countries (Table 21).

District and village level

Reorientation of IRS activities has often required training or retraining of public health staff involved in the program to increase their knowledge and give them the required skills for their roles in malaria vector control partnerships. Staff in other sectors and representatives of civil society organizations may also need additional training. In districts or villages, inter sectoral partnerships should be established; consequently, the health sector should have working relations with other public sectors. In particular, analysis and decision making skills should be developed and maintained in community leaders and local malaria vector partners to ensure appropriate planning and implementation of local strategies (Table 22).

Conclusion

Indoor Residual Spraying needs rational decision-making process to optimize the use of resources for malaria vector control. The implementation of Indoor Residual Spraying (IRS) helps to find and use more local evidence, to integrate the intervention where appropriate and to collaborate within the health sector and with other sectors, as well as with households and communities. By reorientation to IRS, malaria vector control program will be better able to meet the growing challenges in the control of malaria in the face of dwindling public sector human and financial resources. There is need to have an operational framework for monitoring and evaluation to guide managers, supervisors, partners and those implementing IRS in designing more efficient, cost-effective approach and implementation systems. As a nation, Zambia needs a Malaria Vector Control Policy and an intersect oral steering committee that will be able to establish IRS national strategy. IRS has to transform the conventional system of malaria

vector control by making it more evidence based, integrated and participative. This may require changes in roles, responsibilities and organizational links. The transition to new IRS paradigm involves both reorientation of malaria vector control programs and embedding IRS within local primary health systems. Intersect oral partnerships and collaboration at both national and local levels will result in cost savings and benefits to other health services. Other relevant sectors, such as agriculture, environment, mining, industry, public works, local government and housing, should incorporate IRS into their own activities to prevent malaria vector proliferation and disease transmission. Capacity-building, in particular human resource development has been the major challenge, because the IRS strategy requires skilled staff and adequate infrastructure at central, provincial, district and local levels. Like any new approach, IRS must be actively advocated and communicated in order to become established. The general public must also be made aware of the strategy and participate in its implementation. There has been a need to strengthen the capacity at all levels in order to timely implement and strengthen quality performance for Indoor Residual Spraying Campaign Program for malaria elimination in Zambia.

Acknowledgement

I would like to thank my colleagues from the provinces who opened doors for consultation whenever I was into a terrible spot or had a question about my research or writing. They consistently allowed this paper to be my own work and steered me in the right direction whenever I needed their thoughts. I would like to further thank experts who were involved in the validation of the assessment for this research paper. Without their passionate participation and input the assessment could not have been successfully conducted.

Abbreviations

CHAs: Community Health Assistants; CMTAF: Community Malaria Task Force; CSO: Central Statistics Office; DHO: District Health Office; DMATF: District Malaria Task Force; DSA: Daily Substance Allowance; ECOWAS: Economic Community of Western African states; EHT: Environmental Health Technologist; HACs: Health Advisory Committee; HR: Human resource; IDSR: Integrated Disease Surveillance and Response; IGADI: Intergovernmental Authority Development international; LLINs: Long Lasting Insecticide Nets; NHCs: Neighbourhood Health Committees; PHO: Provincial Health Office; PMTAF: Provincial Malaria Task Force; SADC: Southern African Development Cooperation; TOR: Terms of Reference; ZAWA: Zambia Wild Life Agency; ZESCO: Zambia Electricity Supply

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Citation: Kooma EH, Cheelo M, Chisanga A, Chifwesa A, Wakunuma T, Nyirenda C, et al. (2020). Improving Indoor Residual Spraying for Malaria Elimination: Emulating Success Factors, Lessons Learnt and Best Practices from Cholera Out-Break in Zambia. SunText Rev Med Clin Res 1(1): 107.



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