AMP The Alliance for Malaria Prevention
Expanding the ownership and use of mosquito nets

Guidance on managing waste generated during mass insecticide-treated net (ITN) distribution campaigns in the COVID-19 context

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Remember the COVID-19 infection prevention measures[1]

- Maintain physical distance of at least one metre from all others, except immediate members of the family or people with whom you share accommodation
- Regularly and thoroughly clean your hands with an alcohol-based sanitizer or wash them with soap and water. WHO recommends washing hands often with soap and water for at least 20 seconds. If soap or hand sanitizer are not available, rub hands vigorously with wood ashes
- Avoid going to crowded places
- Avoid touching your eyes, nose and mouth
- Practise respiratory hygiene by coughing or sneezing into a bent elbow or tissue and then immediately dispose of the tissue[2] and wash your hands
- If you have fever or respiratory symptoms, you should stay home and not go to work
- Wear a fabric mask if there is widespread community transmission, and especially where physical distancing cannot be maintained
- Correctly use and dispose of any COVID-19 infection prevention materials provided. Follow national government guidance for disposal
- Maintain all other measures described even when wearing protective equipment
- Keep up to date with the latest guidance and regulations put in place by WHO and the national government

NOTE: As the pandemic evolves, WHO updates the infection prevention measures based on new scientific findings. Check for any updates on https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public.

Core AMP documents: *Key guidance for distribution of insecticide-treated nets (ITNs) during COVID-19 transmission*
Planning for safe ITN distribution in the context of COVID-19 transmission See:
https://allianceformalariaprevention.com/about/amp-guidelines-and-statements/

[1] https://www.WHO.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public

[2] Follow WHO and national guidance on waste disposal. Waste should be disposed of appropriately where it will not be in the environment risking contaminating others. See also: https://www.who.int/publications/i/item/water-sanitation-hygiene-and-waste-management-for-the-covid-19-virus-interim-guidance and Sactihttps://apps.who.int/iris/bitstream/handle/10665/85349/9789241548564_eng.pdf;jsessionid=6C768BF7367144EE84ADD13BDFDA7187?sequence=1

Understand the need for waste management

During mass insecticide-treated net (ITN) campaigns, waste is generated at all levels of the campaign during planning and implementation, and a plan should be established to minimize the impact of the campaign on the environment. While this document will largely focus on implementation level waste management planning, national malaria programmes should ensure that plans are in place to manage waste generated at workshops, trainings and other coordination and planning venues at central and decentralized levels, including waste from COVID-19 infection prevention measures put in place, as part of their broader effort to reduce their environmental footprint.

During mass ITN campaigns, plastic waste contaminated with insecticides is always generated whether or not the ITNs have individual packaging. Waste includes the bale wrapping, as well as strapping and other plastic materials that have been used (e.g. plastic bags inside the bale wrapping containing the 50 unpackaged ITNs). Individual plastic packaging for nets or bales must always be considered toxic waste and should not be reused. Waste management aims at diminishing the possibility of plastic waste, as well as residual chemicals from the ITNs adhering to plastic materials used to package ITNs, being spread into the environment.

In the COVID-19 context, considerations for waste management must include protecting against spreading the virus, particularly with the exchange of plastics such as ITN packaging between people. Until more is known about how long the virus can live on different materials, individual ITN packaging, bales, baling material, strapping and other plastic wrapping, as well as non-reusable or damaged personal protective equipment (PPE), may all carry a risk of COVID-19 transmission if not handled appropriately and according to stringent waste management procedures established at the national level.

Work with government agencies, including the national COVID-19 task force, to understand the waste management options

Waste management policies, procedures and planning depend on the options available in each area where the campaign will take place. In some countries, the Ministry of the Environment (or its equivalent) will have information on recycling and incineration facilities that exist in the country, whether public or private sector, that may be used for management of the ITN packaging waste. National malaria programmes should collaborate with the Ministry of the Environment to discuss the options available and to validate the approach to be adopted.

It is important for the national malaria programme to work closely with the national COVID-19 task force from the time of the macroplanning process. With a thorough understanding of the campaign strategy, representatives from the national task force will be able to advise on infection prevention measures for the different campaign activities, including waste management, particularly at the implementation level.

National malaria programmes should also discuss with staff working on immunization and other health campaigns to understand the challenges faced in effective waste management at the implementation level and plan and budget for mitigation of these challenges.

Reduce waste through procurement choices

Procurement considerations are an important part of waste management planning since packaging options for ITNs (individual or bulk)[3] and choices for PPE, in particular masks (re-usable rather than disposable)[4], can diminish the amount of waste generated that needs subsequently to be managed as part of the waste management plan.

ITNs

For ITNs, national malaria programmes can reduce waste by specifying packaging requirements when preparing a tender, including ordering nets without individual packaging. When individual packaging is preferred or required (i.e. for deployment of new net types that are being evaluated or based on country policies and decisions), alternatives to plastic packaging, such as biodegradable or other non-plastic bags, should be requested at the time of ITN procurement and tendering. It should be noted, however, that biodegradable or other non-plastic bags still need to be managed as waste and are likely to be more expensive to procure.

When making requests for alternative packaging, national malaria programmes should organize specific discussions with their funding and procurement partners to understand the options and the costs that will be incurred to have a more climate/environmentally friendly waste management solutions, as well as the timeline. As many suppliers do not have demand for non-plastic packaging, procurement timelines may be extended for options outside standard specifications.

PPE

For PPE, national malaria programmes can reduce waste by purchasing locally produced fabric masks to be used by campaign personnel during the implementation of activities and then kept after the campaign for continued personal use[5]. Waste is also reduced where gloves are not procured for COVID-19 infection prevention (as recommended by WHO)[6] but only for campaign personnel that will be handling ITNs without individual packaging to protect their hands from the insecticide. Regardless of the procurement choices made, there will still be waste generated from PPE for COVID-19 infection prevention, including reusable masks that are damaged, bottles for hand sanitizer, etc.

[3] https://www.continuousdistribution.org/wp-content/uploads/2017/02/USAID-Recommendations-LLIN-Packaging.pdf
[4] https://www.who.int/news-room/q-a-detail/coronavirus-disease-covid-19-masks
[5] See WHO guidance on how to care for a fabric mask: https://www.who.int/docs/default-source/coronaviruse/risk-comms-updates/update-30-use-of-masks.pdf?sfvrsn=eeb24c14_2
[6] https://www.who.int/news-room/ebola-photos/detail/images/default-source/searo---images/countries/bangladesh/infographics/ask-who-social-distancing/english/wearing-gloves

"Naked" nets in Chad. © Malaria No More

Develop a waste management plan

The development of a costed waste management plan that will be implemented from the distribution level and at other levels of the campaign structure is critical. Regardless of decisions made about ITN packaging, PPE and other campaign materials to reduce generation of waste, there will still be decisions to be made about waste management including management of hazardous waste (insecticides or used PPE). As applicable, guidance for disposal of insecticide tainted packaging as per the manufacturer's instructions should be followed and incorporated into campaign planning and social and behaviour change (SBC) messaging as needed.

A waste management plan should include:

- The waste that will need to be managed (ITN and PPE)
- The waste that will not be managed during the campaign or included in the campaign budget but that still requires clear instructions for campaign personnel and/or households on its disposal (e.g. hand sanitizer bottles that will be retained by personnel or ITN packaging retained at household level)
- The waste management chain (e.g. where waste needs to be moved from the community level to the district or regional level for incineration) for both ITN and PPE waste, which may differ depending on national regulations for medical waste
- The roles and responsibilities of campaign personnel at different levels of the waste management chain
- The procedures that will be followed for safe disposal of all waste, including steps for reducing risk of exposure to COVID-19
- The accountability procedures that will be established to ensure that all waste generated during the campaign is correctly managed
- The report required at the end of the waste management operation

Refer to the Annex for a calculation of the macro budget for the transport of ITN packaging waste (individual plastic packages and baling and PPE).

Ensure that training at all levels covers waste management

Waste is generated at all levels of the campaign, particularly in the COVID-19 context. For this reason, training at all levels should cover:

- How PPE, particularly masks, should be put on and removed with limited damage
- How PPE needs to be disposed of (such as masks, hand sanitizer bottles, etc.) and managed
- How personnel managing the waste should protect themselves against transmission of COVID-19

Training should include what to do with disposable masks, other PPE and plastic materials used, such as gloves used to protect ITN distributors, but should also include the management route for longer-term items such as hand sanitizer containers or reusable masks when they are no longer usable. The SBC sub-committee should work on messages that can be disseminated to campaign personnel during training regarding appropriate household-level waste management.

Select an option for management of ITN packages: collect and store before disposal or disposal at household level

Where individual ITN packaging is chosen, there are two main options for waste management:

1. Retain the individual packages with the distribution teams (whether door-to-door or fixed site) for centralized waste management each day and/or at the end of the distribution period or
2. Allow the household recipients to take the packages home and dispose of them once they have hung their new ITNs.

Option 1: Retention of individual ITN packages at fixed distribution points has been the main approach that national malaria programmes have taken for waste management. This is in part due to the belief that resale of nets is discouraged if ITNs are removed from their individual packages and in part related to centralization of the waste management process and limiting the possibility of toxic plastic bags being improperly reused or disposed of inappropriately at the household level. Retention of individual ITN packages by distribution teams can be continued in door-to-door distribution to address both waste management challenges at household level and to reduce the possibility of COVID-19 being spread when the plastic bags are handed from the campaign personnel to the ITN recipient.

At the end of each day of the distribution (whether fixed site or door-to-door) all waste, including both ITN packaging and used or no longer reusable PPE, should be put in waste collection bags. For both fixed site and door-to-door distribution, waste management bags should be made available at the start of the day and used to collect waste in real time, i.e. not letting waste build up and bagging it when too much has accumulated. Unless national policies mandate separation of waste at the community level, it is recommended that waste from ITNs and PPE is bundled together and that separation of waste, if needed, takes place at higher levels of the waste management chain (e.g. health facility, sub-district or district) where skilled personnel and appropriate protection equipment should be available.

Option 2: For operational considerations (time per household) individually packaged ITNs could be handed to households in their plastic bags. This option, however, may make it more likely that household members store the ITN rather than use it immediately. Strong and sustained SBC messaging will be required during the campaign and post-campaign to ensure that household members understand

the need to use the ITNs, dispose of the packaging and not reuse the bags for any purpose, such as being used by schoolchildren as book bags, or used by households to store and transport vegetables and other food. The requirements for safe disposal may be, however, difficult for many households to comply with, and there could be environmental risks if bags are burned in the open air. buried too shallowly or disposed of too near water sources.

Closed bags of waste from individually packaged ITNs ready for transport in Burkina Faso

Naked nets distributed in Chad 2011
© Malaria No More

Ensure that SBC messages include household level waste management (as applicable)

In some cases, such as where biodegradable or non-plastic packaging for individual ITNs is the option selected during procurement, waste may be managed at the household level. This is also the case for fabric masks and hand sanitizer received by campaign personnel during the campaign and which will need to be disposed of post-campaign as they become no longer usable. The SBC sub-committee should develop messages that can be disseminated to households either by radio or during door-to-door activities (registration and distribution) where packaging will be managed at the household levels. Messages should include appropriate management of waste based on either supplier instructions or national waste management guidelines.

Budget for closable waste bags and secure waste disposal containers at health facility level

Prior to COVID-19, waste materials could be left in open bags until they could be transported to their final destination (if not household level). If the option chosen is for ITN packaging to be removed before ITNs are handed over to household members, national malaria programmes should consider planning and budgeting for dedicated waste bags that can be closed. If the strategy is for modified fixed site ITN distribution, these bags can be filled at the fixed site and should then be deposited in a waste disposal container at health facility level. If door-to-door teams are removing packaging at households, their

supervisor should collect the bags at the end of each day and take these to the health facility waste disposal container.

Given the potential risks associated with COVID-19 transmission through the plastic packaging or used/no longer reusable PPE if they are not correctly handled, waste collection bags should be sealed at the end of each day when all the waste has been collected and the waste collection bags should not be reopened before final disposal of the waste. To prevent scavengers from accessing waste material, the bags must be kept in secure storage (e.g. locked ITN warehouse/storage site) until the waste material is collected for transport to disposal sites.

Ensure the safety of workers involved in waste management

Workers involved in collection and disposal of the waste generated during the ITN campaign must be protected from the different risks related to the management of the ITN packaging and used PPE. At the implementation level (e.g. community), unless otherwise advised through national policies, waste generated during the campaign will be collected together (e.g. both ITN and PPE waste). At different levels of the waste management chain, including for workers disposing of the campaign waste at final destination points, provision should be made for personal protective equipment according to national policies and procedures where this is not already provided for routine health waste management. Where no national policies are in place, WHO should be consulted for technical guidance. During transport of waste, vehicles should be used that have a barrier between the cargo area and the cab to protect the driver and any passengers.

Dispose of campaign waste materials safely

Recycling

In some countries, options may exist to recycle plastic packaging waste from the ITN distribution. Mapping of potential recycling possibilities should be done during macroplanning and updated during the microplanning workshops. The list of companies operating in the country that are undertaking recycling and the types of material that can be accepted for recycling should be obtained from the Ministry of the Environment (or its equivalent). The Ministry of Agriculture may also be a source of information on recycling of insecticide-tainted packaging.

Once identified, national malaria programmes should engage with these recycling companies early in the planning process to determine the possibility of their involvement in the waste management aspect of the campaign and which elements they can contribute to or manage. Partnering with companies for improved environmental outcomes will benefit both the national malaria programme and the companies, who can leverage their contribution and support to public sector initiatives to improve health in their advertising and engagement of new partners. Communities will also benefit from the lack of discarded plastic material.

Incineration

Environmental considerations have changed campaign planning for waste disposal and raised it to a higher-level priority during the planning process. Digging a shallow pit and burning plastic bags in an open-air site as was done in the past is no longer an option[7].

[7] WHO provides no guidance on open burning "due to the human and environmental harm resulting from open burning. The process should be minimized and eliminated as soon as possible". WHO (2019) *Overview of technologies for the treatment of infectious and sharp waste from health care facilities*.
https://apps.who.int/iris/bitstream/handle/10665/328146/9789241516228-eng.pdf?ua=1

Plastic ITN packaging should be incinerated ONLY if the specified high temperature incineration conditions for pesticide-tainted plastic can be guaranteed and Food and Agriculture Organization (FAO)/WHO and Basel Convention guidelines[8] can be strictly followed.

During the macroplanning period, a country-level mapping of available and appropriate incinerators (where they are found – district, region, central level) should be done in order to plan and budget for the transport of waste to the incinerators. The mapping should be updated during the microplanning to verify the availability and functionality of the incinerators.

Burial in a controlled waste disposal site

If recycling or controlled high temperature incineration are not possible, burial of the insecticide-tainted packaging and other materials which may be contaminated with COVID-19 is an option. To prevent the insecticide from leaching through the soil to the water table, burial may only be done in soils with low permeability, preferably down gradient from any known domestic water sources, at least 100 metres from wells or other domestic water intakes or high-water marks of lakes/wetlands. Materials should be buried at least two metres above the highest annual water table level. When the burial site is almost full of waste, the last metre of fill should be compacted soil and possibly covered by a metal or concrete cover. Identifying appropriate waste burial sites may require hiring a specialist company to map possible locations as knowledge about soils and yearly high-water table level is very technical and specialized. Where this is necessary, ensure that it is costed in the waste management plan.

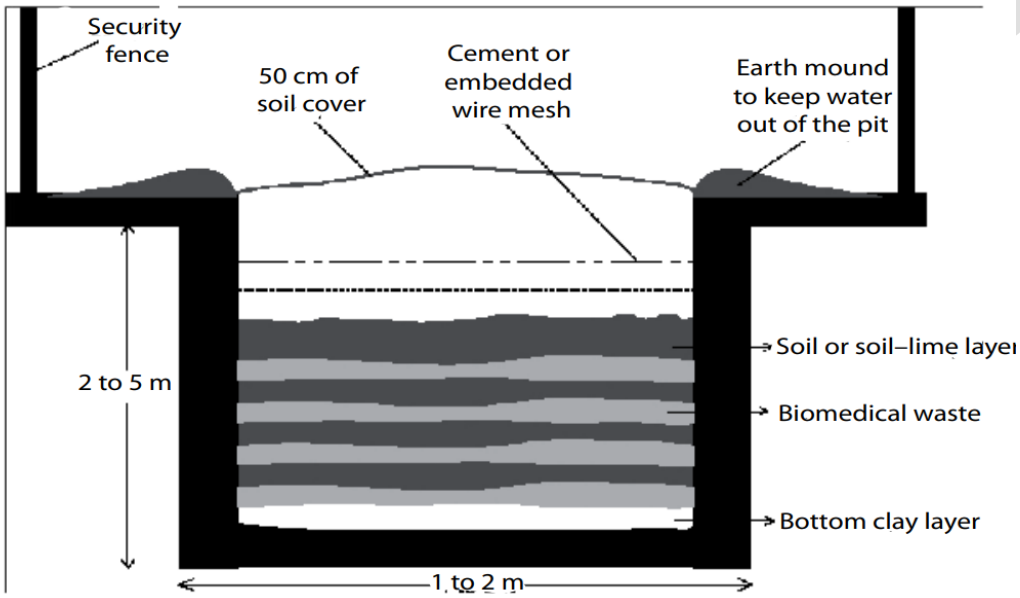
Previously, when burial was carried out at distribution point/health facility level, respecting the criteria for burying materials at the appropriate depth with one metre of soil covering was often problematic. Problems may occur because of the amount of work required or personnel not understanding the need to keep materials away from scavengers. National malaria programmes should determine the risks and mitigation for burying waste at all distribution or pre-positioning sites (including the non-adherence to the recommendations above) versus the transport of waste to district level waste disposal areas that are prepared, staffed, equipped and supervised specifically for this purpose. In this case, the national malaria programme should work with the department or organization responsible for waste management to estimate costs in addition to those for the transport of the waste.

An option to prevent scavenging of waste disposal sites would be to decrease the number of sites selected for waste management and increase security by fencing and applying a metal grid or concrete cover. In a recent example in Mauritania, waste was collected from 513 health facility sites and transported to the 21 district level sites established for disposal of health facility waste material. These bigger sites, which are managed by the district health administration to respect the waste disposal guidelines in place for medical waste, have fencing and security. Managing campaign waste can be better controlled with fewer sites and more qualified personnel. The Mauritania national malaria programme will use the same waste disposal sites for the disposal of waste generated through the upcoming ITN campaign.

[8] Basel Convention Technical Guidelines specify that "The condition for the optimal incineration of material is: Temperature of 850°C—1100°C for hydrocarbon wastes and 1100°C—1200°C for halogenated wastes; sufficient (gas) residence time in the incinerator (EU legislation requires two seconds as a minimum)."

Waste burial arrangements from WHO[9] state:

- Dig a pit one to two metres wide and two to three metres deep. The bottom of the pit should be at least one metre above the groundwater.
- Line the bottom of the pit with clay or permeable material.
- Construct an earth mound around the mouth of the pit to prevent water from entering.
- Construct a fence around the area to prevent unauthorized entry.
- Inside the pit, place alternating layers of waste, covered with 10 centimetres of soil (if it is not possible to layer with soil, alternate the waste layers with lime).
- When the pit is within about 50 centimetres of the ground surface, cover the waste with soil and permanently seal it with cement and embedded wire mesh.



Cost the waste management plan

Once all decisions have been taken on the waste management plan and the different elements are well-defined, the plan should be costed and included in campaign budgets/overall funding applications. It is important to estimate the transportation requirements if waste needs to be moved to a location with an incinerator or to a central point for burying. For these estimates, it is necessary to factor in the movement from the distribution level (distribution point or pre-positioning site) to the disposal destination. This should be estimated in conjunction with logistics staff since the process is essentially a reversal of what was done to move the ITNs and materials from the central level to the final operational level.

[9] WHO, *Safe management of wastes from healthcare activities*, Second edition. See page 249. https://apps.who.int/iris/bitstream/handle/10665/85349/9789241548564_eng.pdf;jsessionid=6C768BF7367144EE84ADD13BDFDA7187?sequence=1

Annex: Calculation of macro budget for the transport of individual packaging waste

1. Estimate the volume of waste per bale for the ITNs you will receive ("C" in the equation below). For example, ITNs were ordered with individual packaging and the empty packages were retained at the distribution points for transport to be incinerated. The volume (length x width x height) of the waste at a site was 0.18m^3 following the distribution of 85 bales of 50 ITNs. The volume of waste per bale of 50 individually packaged nets was therefore 0.18m^3/85 = 0.0021m^3.
2. Estimate the distance between each distribution point and its associated disposal point for recycling, incineration or burial. ("E" in the equation below).
3. Estimate the cost to transport one m^3 of waste for one kilometre ("F" in the equation below).
4. Fill in a spreadsheet with the information as per the table below, plus the number of ITN bales planned for each storage point, to estimate the waste transportation costs for each distribution point and overall.

Example:

A	B	C	D = B x C	E	F	G=D*E*F
Distribution storage area (ex DP)	**Number bales of ITNs / DP**	**Waste volume / bale (m^3)**	**Total waste volume (m^3)**	**Distance to incineration or recycling point (km)**	**Transportation cost / m^3 of waste /km**	**Transportation cost for waste from this DP**
Northeast	90	0.0021	0.189	65	$0.50	$6.14
West	71	0.0021	0.149	120	$0.50	$8.95
Total						**$15.09**

Note that for the management of waste generated from COVID-19 infection prevention, such as non-reusable masks, hand sanitizer bottles, etc., a small percentage could be added to the estimated waste volume (e.g. less than 10 per cent) to ensure that this waste is planned and included in the budget. As noted above, it is best if waste is transported and managed at levels of the health structure that have staff, equipment and appropriate supervision. Where PPE procured includes non-reusable masks, national policies should be reviewed and quantified and where these do not have sufficient detail, WHO should be contacted for technical guidance.