

ザンビア共和国
保健省

ザンビア共和国
感染症対策塗料普及促進事業
業務完了報告書

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独立行政法人
国際協力機構 (JICA)

関西ペイント株式会社

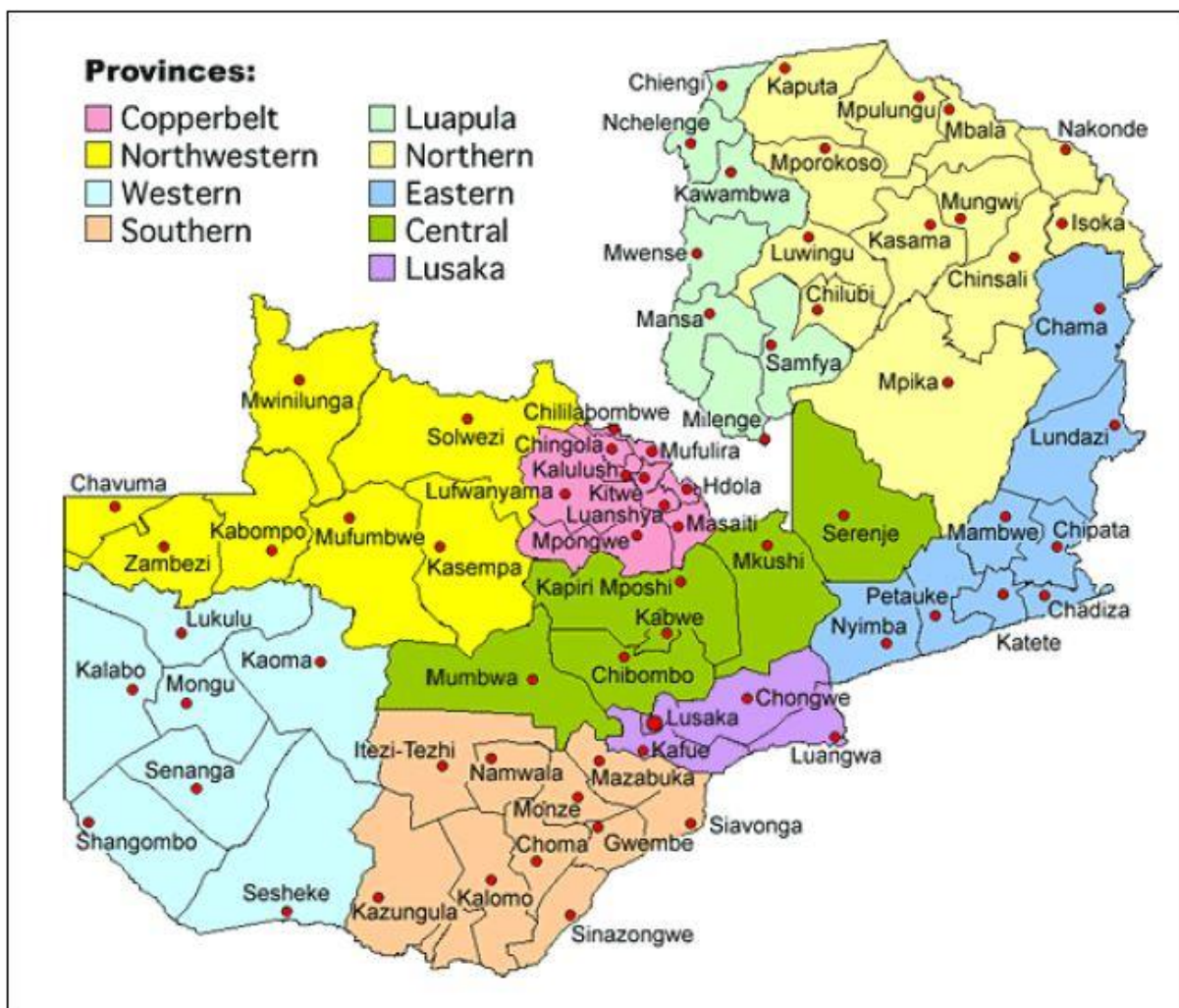
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地図



*出典元：JICA 海外協力隊の世界日記

略語表

略語	正式名称	日本語名称
ザ国	Republic of Zambia	ザンビア共和国
AMP	ANTI MOSQUITO PAINT	防蚊塗料
IRS	Indoor residual spray	屋内残留性噴霧
KP	KANSAI PAINT CO., LTD.	関西ペイント株式会社
KPJ	KANSAI PAINT JAPAN	関西ペイント株式会社 日本
KPAL	KANSAI PLASCON AFRICA LTD.	関西プラスコンアフリカ
KPZL	KANSAI PLASCON AFRICA ZAMBIA LTD.	関西プラスコンアフリカ ザンビア社
MOH	MINISTRY OF HEALTH	保健省
NMEC	NATIONAL MALARIA ELIMINATION CENTRE	—
NHRA	National Health Research Authority	—
UNZAREC	University of Zambia Research Ethics Committee	ザンビア大学研究倫理委員会
ZEMA	Zambia Environmental Management Agency	ザンビア環境管理局

第1章 要約

1.1. 要約

本事業は、関西ペイント(以下、KP(略称名))が開発した蚊を撃退する機能性塗料: Anti Mosquito Paint(以下、AMP(略称名))を居住空間に塗装することでマラリアの予防施策として機能させ、感染地域の人々の暮らしや健康を改善し、現地において社会貢献活動、経済活動などを促進することを目指すものである。

ザンビア(ザ国)では、年間約40%の人々がマラリアに感染し多くの人々が亡くなっており、ザ国の保健医療システムにも大きな負担となっており、人的に・経済的にも甚大な被害を与えている。ザ国保健省(以下、MOH(略称名))では2021年までにマラリアを撲滅するという大きな目標を掲げており、この取組みも当事業の推進を後押しするものとなった。

当事業の大きな達成目標として以下2点を設定した。

- 1) マラリアへの予防施策としてAMPの有用性(安全性、効果)を実証・評価され、AMPの製品認可を得る。
- 2) 販売認可を取得後、社会貢献面、ビジネス面も考慮した持続的なビジネス活動を確立する。

成果概要は以下の通りであり、当完了報告書の詳細説明を参照。

- 1) JICA、ザ国MOHの協力の元、マラリア感染地域において一般民家:400軒に対して対象塗料を塗装し、2017年11月より実証試験を開始した。

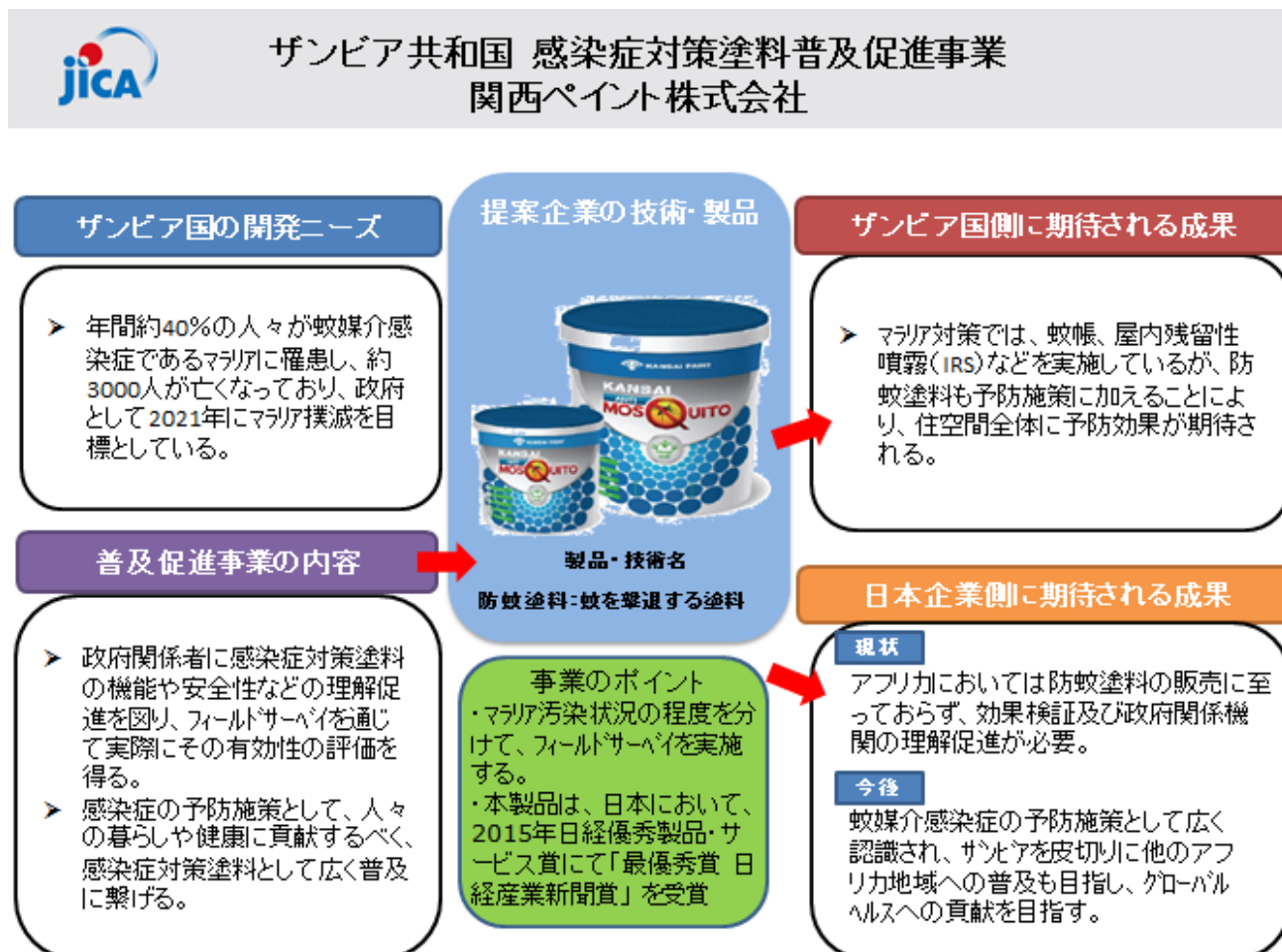
その結果、安全性評価ではAMP塗布エリアとコントロールエリアとで報告された症状に違いはなく、AMPによる悪影響は見られなかったと結論づけられた。及びその効果では、昆虫学的評価(コーン試験)においてAMP塗布エリアとコントロールエリアで顕著な差が確認された。また、AMP塗布エリア、コントロールエリア共に5地区全てにおいて、アカイエカの室内滞在密度を減少させ、ハマダラカについては捕獲することができなかつた。これは塗料の忌避、刺激効果が影響した可能性があると考察している。

ザ国では今迄、防蚊剤を含有した塗料は認可されておらず、またその認可方法も明確に定義されていない困難な状況であったが、上記実証試験結果がザ国MOHに評価され、実証試験開始後6か月でMOHより製品認可を得ることができた。

- 2) 当事業を通して、ザ国においてAMPの販売認可を得ることができ、2018年10月から販売を開始いたしました。当社現地法人KANSAI PLASCON ZAMBIA社(以下、KPZ(略称名))では、2019年10月迄の売上実績で(非公開)を売上げ、社会貢献活動や販促活動を通じてザ国で高評価を得ている。

今後のビジネス展開では、ザ国においては3年後に年間100KLを販売することを目標としており、また当事業で得られたノウハウを元に、東アフリカを中心としたマラリア重点感染地域に展開する計画である。ザ国に続き、ウガンダでも展開することができたが、今後も工数、費用の限られる中、ケニア、タンザニアへと展開し、多くの地域でマラリアの新しい予防施策として根付くよう、事業展開を進めていきたい。

1.2. 事業概要図



第2章 本事業の背景

2.1. 本事業の背景

ザ国の医療水準はいまだ十分ではなく、Zambia National Health Strategic Plan 2011-2015によれば、ザ国は、マラリアを筆頭に、気道感染、HIV/AIDS、結核、性病等の感染症による脅威は大きく、これを軽減することは保健行政上の大きな課題の一つとなっている。

外務省の在外公館医務官情報には、医師や看護師の不足に加え医薬品や医療機器も不足しており、アフリカ諸国の中でも特に医療事情の悪い国の一つとの記述があり、衛生事情は非常に悪く、毎年コレラや赤痢などの経口感染症が多く発生するとある。また、1,000人あたりの乳幼児死亡数も43人（WHO 2015データによる、日本は2人）と高く、母子保健の改善も大きな課題となっている。

ザ国では、このような状況の改善に取り組んでいるが、経済的、かつ長期に亘っての感染症リスクを抑制する効果的な対策は依然不十分な状況といえる。

ザ国は熱帯地域に属しており、大部分は温帯湿潤気候や熱帯サバナ気候の高原であるものの、最も寒い6月で最低気温5℃前後、最も暑い10月で最高気温33℃前後となり、熱帯熱マラリアの好発地域である。首都ルカサは標高が高いため、地方に比べマラリアの感染率は低いものの、一年を通して患者が発生する環境にある。2005年時点で383症例/千人、2010年時点で246症例/千人となっており、医療施設受診者の4割を占めることから、ザ国として、防虫蚊帳や屋内防虫剤塗布を含むベクターコントロールを中心に、全国を3つの地域①ルサカ周辺地域、②若年層の感染リスクが10%程度の地域（Central, Copperbelt, Northwestern, Southern, and Western Provinces）、③若年層の感染リスクが20%程度の地域（Eastern, Luapula, and Northern Provinces）に分け、マラリア抑制に力を入れて取り組んでいる。

また、ザ国政府としても、マラリア撲滅に積極的に取り組んでおり、“National Malaria Elimination Strategic Plan 2017-2021”をザ国MOHが主体となって推進しており、ベクターコントロールへの強い関心をもっており、このような背景も今回の事業を推進するうえで追い風となった。

(参考サイト) <https://www.NMEC.org.zm/malaria-elimination-strategic-plan>

2.2. 普及対象とする技術、及び開発課題への貢献可能性

2.2.1. 普及対象とする技術の詳細

防蚊塗料 (Anti Mosquito Paint)	
製品・技術画像	
発売開始年	2018年(ザ国)
特徴(強み)	<ul style="list-style-type: none"> ・強み: 蚊を撃退し、血を吸う能力を削ぐ。また、汚染除去性にも優れているため、住空間の清潔感が保てる。クリヤータイプで、旧塗膜の上や壁紙の上から塗装でき、見た目を変えずに塗れる。
技術の分類 (大分類) (小分類)	<ul style="list-style-type: none"> ・水性内装用塗料 ・機能性塗料
機能①	蚊を撃退する。
機能②	蟻、蜘蛛などの節足生物にも効果がある。
機能③	通常の水性エマルジョン塗料同様の機能が有り、住宅や施設などの内装に塗装することができる。
価格(定価)	WHITE: 250ZMW/5L、850ZMW/20L Pastel: 260ZMW/5L、890ZMW/20L *ZMW=7.56円 2019年11月24日時点
経済性	上記1Lで7㎡(一部屋)を塗装できる。
操作性	ローラーでの簡易塗装。
耐久性	環境にも因るが最大2年の効果が期待できる。
安全性	通常の水性塗料と同等。
環境への配慮	<ul style="list-style-type: none"> ・ほぼ無臭の水性塗料。 ・本品及び洗い水などを下水に流すと薬剤が魚などに影響を及ぼす可能性がある。

対象国における競合技術との比較	<ul style="list-style-type: none"> ・塗料での競合技術は無し。 ・蚊帳や IRS がマラリア対策として同じ目的にあたるが、蚊帳と比べて手間が掛からない点、塗装された居住空間全体への効果などのメリットがあり、また IRS と比べると施工空間での臭気や施工空間が清潔に保たれるなど快適な生活ができると考えます。
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*1 Technical design sheet of AMP、 *2 Safety Data sheet

2.2.2. 開発課題への貢献可能性

ザ国では改善されたとはいえ、2014年時点でも約600万人がマラリアに感染し、3,000人以上が亡くなっており、改善が必要な状況。現在、蚊帳、殺虫剤の屋内残留散布、妊婦への予防薬の投与などが対策となっているが、AMPによる防蚊対策では、塗装された居住空間全体が対象であり、24時間フルサポートすることにより、大きな効果を得られることが期待される。

また、マラリア感染者の約4割が公的保健医療機関で治療を受けていると推測されており、ザ国保健医療システムに人的・経済的に大きな負担となっている。AMPの活用推進により、マラリア感染を予防することで、ザ国医療費を減らすことが可能となれば、脆弱なザンビアの保健システムを強化することに予算を活用することが出来、妊産婦の健康などの他の改善にも繋がると考える。

第3章 本事業の概要

3.1. 本事業の目的及び目標

3.1.1. 本事業の目的

当社では、塗料事業を通して社会に貢献するという社是の元、機能性塗料で新しい市場を開拓し、尚一層、人々の暮らしや健康に貢献し、現地において経済活動、雇用を促進することを基本理念としております。

今回、ザ国に蔓延する感染症対策として、有効な予防施策に繋げるという目的の元に本事業を提案致しました。また、防蚊塗料においては防虫剤を配合していることもあり、安全性や環境影響を十分に考慮し、ザ国保健省とも協議をしながら、人々や環境に悪影響などを与えないよう、万全の注意を払い進めることを留意事項としたい。

3.1.2. 本事業の達成目標（対象国・地域・都市の開発課題への貢献）

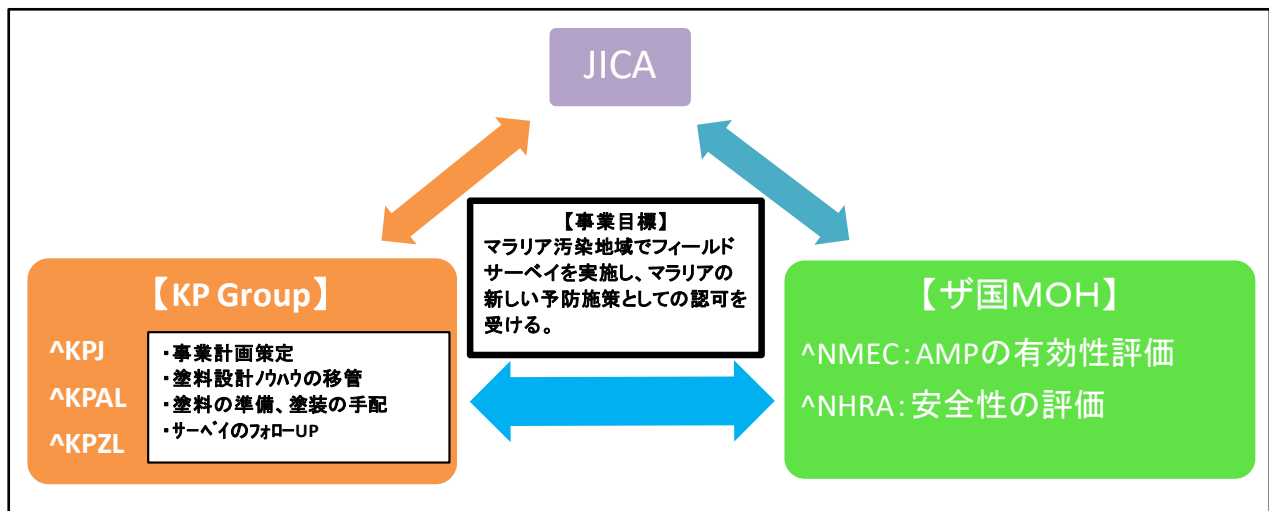
感染症対策塗料の感染予防の有効性を実証し実用化に結び付けることで、感染症の疾病負荷を減らすこと。

防蚊塗料では、マラリア予防施策への貢献が期待されており、マラリアでは乳児や妊婦への被害が甚大で有り年間約3000人が亡くなっている状況の中、既存の対策に加え、内装塗料による対策では塗装された居住空間全体が対象で有り、複雑な手間も無い為、その有用性を実証し普及する。

3.1.3. 本事業の達成目標（ビジネス面）

- ・現地製造により価格的にも購入し易い製品の流通を可能にすること。

3.2.2. 実施体制



本事業の推進は、KPJ 社が主体的に行い、また現地でのサポートについても、子会社である KPAL 社、KPZL 社が密接に行える体制である。

パートナーであるザ国 MOH 並びに政府関係機関は本事業に対し理解を頂いており、JICA ザンビア事務所とともに連携し、事業を進めた。フィールドサーベイにおいては、現地にコーディネーターやサーベイチームを設定し、ザンビア内の複数のサイトで実施する調査に対しても対応できる体制を構築した。

- ・ KPJ 社とアフリカを統括する南ア KPAL 社 が、事業計画策定、塗料配合の検討などを主体的に実施した。
- ・ KPZL 社での現地製造を試みたが、排水処理施設が十分ではなく、施設の整っている KPAL 社で製造し、KPZL 社に輸出するスキームとなった。ザ国での当事業の普及に成功した後は、KPAL 社から C S A 地域への輸出も可能であり、各国での認可取得が条件となるが C S A 地域への展開についても可能性が広がった。
- ・ 現地の子会社である KPZL 社が自国のネットワークを活かし、サプライチェーンの構築、製品 PR 活動、フィールド検証を主体的に実施する。
- ・ 3 社が補完的、有機的に活動できる体制にする。

3.2.3. 実施内容




- ・ 実施目標は、AMP の効果と安全性を実際のフィールドサーベイで MOH と共に検証、及び実証し、MOH より製品上市に対しての正式認可を得ること。
- ・ AMP のフィールドサーベイに先立ち、2017 年 6 月半ばに AMP の効果を確認する目的で実際に NMEC のラボで蚊のノックダウンテストを実施し、そのノックダウン性を確認した。

Mosquito knock-down test at NMEC

<Method>After 30 minutes exposed on AMP panel by WHO cone, it is set 24 hours in the cup with sugar.



After 30 minutes later,
Almost knock-down.

<Result>	Test-a	b	c	Total
Anopheles	10	10	10	30
After24hours (mortality)	10	10	8	28
				93.3% *Criterion : more than 80%.

・その後、ZEMA で防蚊塗料の製品登録申請を行い、8 月頭に登録が完了。その後、UNZAREC へフィールドサーベイの許認可申請を行い、実施へと移行。以下、フィールドサーベイ概要。

<防蚊塗料 フィールドサーベイ概要>

・ザ国 MOH の協力の元、対象エリアにおいて一般家庭に協力を依頼し、防蚊塗料とその比較となる一般内装用塗料を内壁に塗装する。合計各々200 件を塗装。

塗装戸建数	KAPIRI	MUKUSI	SIAVONGA	MANSA	PETAUKE
防蚊塗料	30	40	30	50	50
一般塗料	30	40	30	50	<u>50</u>

*当初、3 地区での予定であったが、MOH の要望により 2 地区(MANSA、PETAUKE)が追加された。

・NHRA(National Health Research Association)によりアンケートを実施し、安全性評価、マラリア罹患の有無などについてアンケートを実施する。(アンケート実施時期：0、3、6、12、24 ヶ月後)

・防蚊塗料の効果と持続性について、NMEC(National Malaria Elimination Center)がWHO指定の蚊のノックダウンコンテストを実施する。

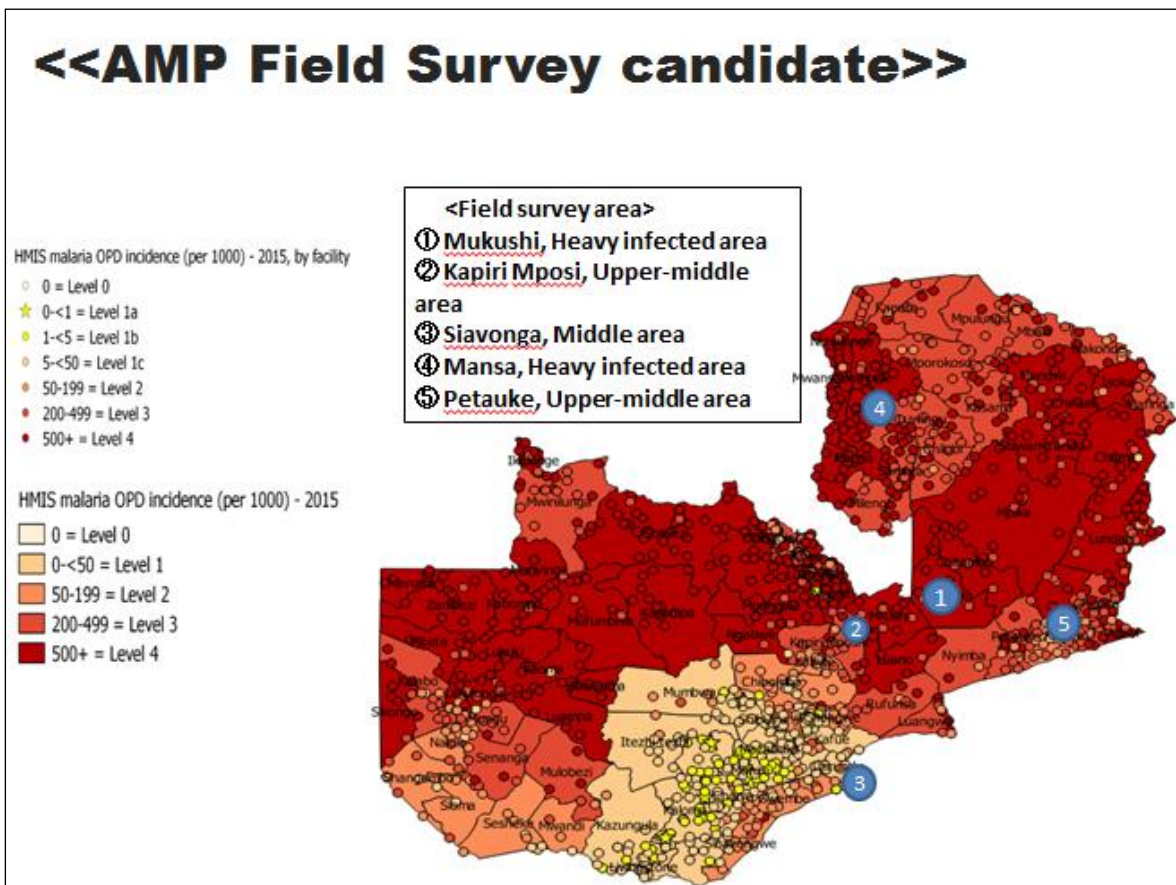
<防蚊塗料 フィールドサーベイ概要> *下記参照

- ・ルサカやその近郊ではマラリア罹患が少ない状況であり、地方で実施することとなった。
- ・マラリア罹患の多い地域～酷い地域を3水準に分け、5候補地で実施予定。

^ Level4 (1000人中500人以上が罹患)、Mkushi, Mansa

^ Level3 (1000人中200-499人が罹患)、Kapiri Mposhi, Petauke

^ Level2 (1000人中50-199人が罹患)、Siavonga.



〈活動内容の概要〉

	タスク	活動内容						実施内容	目標(事業終了時の状態)
	ビジネス展開に向けて事業内に実施すべき項目	第1回	第2回	第3回	第4回	第5回	第6回		
		17.10 (現地)	17.11 (現地)	18.1 (現地)	18.2 (現地)	18.5 (現地)	18.11 (現地)		
1	フィールドサーベイ実施の認可、準備	—						<ul style="list-style-type: none"> ・MOH、ZEMA への認可折衝 ・フィールドサーベイに向けた関係者への事業概要説明会、フィールドサーベイの実施要領、塗装トレーニングの実施。 	<ul style="list-style-type: none"> ・MOH、ZEMA からフィールドサーベイ実施の認可を得た。 ・11月後半からフィールドサーベイを開始できるよう、関係者と計画を共有した。
2	防蚊塗料フィールドサーベイの準備、実施		—					<ul style="list-style-type: none"> ・対象住居の塗装 ・対象住居へのサーベイの開始 	<ul style="list-style-type: none"> ・対象住居への塗装も完了し、サーベイを開始。
3	・防蚊塗料フィールドサーベイの状況確認とサーベイ地区増への対応協議。			—				<ul style="list-style-type: none"> ・サーベイチームへの状況確認 ・追加2地区に対する準備状況の確認とフォロー 	<ul style="list-style-type: none"> ・追加対象地域の塗装を進め、1月末よりサーベイを開始する段取りを組んだ。
4	<ul style="list-style-type: none"> ・フィールドサーベイのフォロー ・AMPの上市に向けた協議開始 				—			<ul style="list-style-type: none"> ・サーベイチームへの状況確認 ・AMP上市に向けた協議 	<ul style="list-style-type: none"> AMPの上市計画について、関係者と情報共有した。

5	<ul style="list-style-type: none"> AMP の上市に向けた準備 					-		<ul style="list-style-type: none"> 5 地区のサーベイ状況の確認。 AMP 上市に向けた詳細計画を策定する。 	<ul style="list-style-type: none"> AMP 上市計画について、関係者と同意、共有した。
6	<ul style="list-style-type: none"> AMP 上市後の市場状況確認 						-	<ul style="list-style-type: none"> AMP サーベイ1年後の状況確認。 AMP 上市後の市場状況確認 	<ul style="list-style-type: none"> サーベイ1年後も良好に推移していることを確認。 市場の反応も良好であることを確認。

第4章 本事業の実施結果概要と NHRA、NMEC によるレポート概要

4.1. 第1回現地活動(2017年10月4日～10月13日)

4.1.1 本活動の要旨

AMP のフィールドサーベイ開始に向けて、ザ国 MOH と連携し、詳細計画立案の元、準備を進める。

当初より、フィールドサーベイは雨季の始まる 11 月末までには始めることを目標に掲げており、その為のキックオフミーティングを関係者(ザ国保健省幹部、サーベヤーなどサーベイ関係者、ペインター)で、10月9～11日で実施した。保健省からはサーベヤー、データマネージャーなど約 20 名、塗装会社からも約 40 名のペインターが参加し、事業の主旨説明、実施事項の説明、実作業のトレーニングを実施し、実施項目や達成すべき目標を共有することができた。

(サーベヤーのトレーニングに阿部、水島が参加し、ペインターのトレーニングに山下、KPZL 技術員が参加した。)

また地方(3地区: Kapiiri, Mukusi, Siavonga) を代表してスーパーバイザーが参加しており、今後のフィールドサーベイ開始に向けての詳細計画を共有することができた。フィールドサーベイ開始まで時間も無い中、地方での事業概要説明会、塗装対象家屋の決定と同意書へのサイン、マッピングなど実施事項も多かったが、順調にスケジュール化することができた。

4.1.2. 主な活動:フィールドサーベイに向けてのオリエンテーション、トレーニングの実施。

<目的>

AMP のフィールドサーベイを開始するにあたり、フィールドサーベイを担当するサーベヤーや対象家屋を塗装するペインターに対して、当事業の概要説明、主旨を説明し、間違いの無い活動ができるようにトレーニングする。

<概要>

2017年10月9～11日、ルサカ市内 Mpanga Yamambwe lodge で AMP のフィールドサーベイに関するオリエンテーション、トレーニングを開催。サーベヤーはザ国保健省主担当者、地方の代表者含め約 20 名が参加、ペインターも実際に施工に関わる塗装会社のスタッフ約 40 名が参加した。

写真：オリエンテーションと塗装研修の様子



<成果>

- ・参加されたサーベヤーやペインターには、当事業の主旨である「マラリア撲滅に向けた活動」ということに理解を得られ、非常に前向きなトレーニングとなった。
- ・サーベヤーからはフィールドサーベイに向けた準備が整ったこと、また地方からの代表者も参加したことによるコミュニケーションの向上が図れたことが大きいと高評価を得られた。

またペインターにとってはトレーニングにより理解が深まり、当事業のみならず、今後の彼らの塗装技術の向上に繋がり、彼らの今後の仕事に活かせるという声も聞かれ、将来的に塗装業の地位向上に繋がることを期待する。

- ・上記トレーニング後に、MOH プロジェクト管理者、地方の代表者と今後のスケジュールについて擦り合わせし、フィールドサーベイに向けての準備や塗装を 11/17 迄に終わらせ、11/20 から蚊の評価 TEST を開始するスケジュールを共有した。

4.2. 第2回現地活動(2017年11月14日～11月17日)

4.2.1 本活動の要旨

第2回現地活動では、フィールドサーベイの準備状況の確認と MOH (保健省)、NMEC(ナショナルマラリアエリミネーションセンター)との今後の進め方に関する打合せが主要な内容となった。

対象3地区 (Mukusi 郡、Kapiri 郡、Siavonga 郡) のフィールドサーベイ準備は、10月後半から開始しており、11月後半の塗装完了に向け塗装も最終段階でありその状況を確認することと、当事業の推進にあたり現地保健省スタッフや住民にその趣旨が十分に説明されているかを確認する。

また、フィールドサーベイ開始に向けての確認事項や課題を MOH、NMEC と擦り合わせを実施致した。

4.2.2. 主な活動:フィールドサーベイ対象地 (Mukusi 郡、Kapiri 郡、Siavonga 郡) の訪問

<目的>

サーベイ対象地の準備状況(塗装状況、住民の理解確認)を確認し、問題なくフィールドサーベイを開始できるよう、状況判断し調整する。

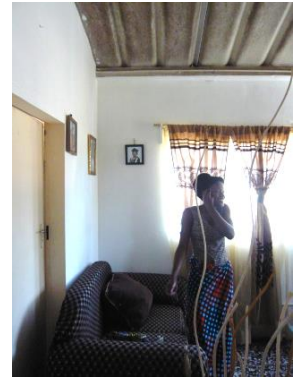
<概要>

- ・ Mukusi 郡への訪問 : 2017 年 11 月 14 日 AM、
^ Mukusi 郡を訪問し、対象家屋を訪問し、塗装状況や住民の理解をヒアリングした。

(参加者)

- ^ 関西ペイント(株) 阿部、山下、水島の3名。
- ^ 関西プラスコンザンビア : DILIP GM(General Manager), Goodson TM(Technical Manager)
- ^ Mukusi 郡保健省オフィサー、Mr. Godfrey Chewe

写真：Mukusi 郡対象家屋の様子



住民への聞き取り調査では、“蚊に刺されなくなった。”、“蚊の数が減った。”、“蚊の死骸が壁際に落ちている。”などAMPの効果を実感されていた。

・Kapiri 郡への訪問：2017年11月14日PM

^ Kapiri 郡の対象家屋を訪問し、塗装状況や住民の理解をヒアリングした。

(参加者)

^ 関西ペイント㈱ 阿部、山下、水島の3名。

^ 関西プラスコンザンビア：DILIP GM(General Manager), Goodson TM(Technical Manager)

^ Kapiri 郡保健省オフィサー、Mr.Sikwiiya Simeon

写真：Kapiri 郡対象家屋の様子



AMP塗装の施された壁に30分設置し、その後紙コップに保管し、24時間後の蚊のノックダウン率を計測する。カピリ郡での試験では90%以上のノックダウン結果が得られた。

・Siavonga 郡への訪問：2017年11月16日AM、

^ Siavonga 郡の対象家屋を訪問し、塗装状況や住民の理解をヒアリングした。

(参加者)

^ 関西ペイント㈱ 阿部、山下、水島の3名。

^ 関西プラスコンザンビア：DILIP GM(General Manager), Goodson TM(Technical Manager)

写真：Siavonga 郡対象家屋の様子



シアボンガ郡保健局オフィサー：Phiri氏と共にAMP塗装済の住宅を視察、ムクシ郡、カペリ郡同様、シアボンガ郡でもAMP塗装後は、蚊が来なくなったという高評価を頂きました。

3 地区のフィールドサーベイ準備状況、主に塗装状況の確認、住民の事業への理解確認を実施した。

塗装においては、スケジュールの遅れも無く順調に推移していた。またトレーニングの成果もあり、塗装品質についても問題無いことを確認し、住民から感謝の言葉を頂いた。官民連携事業において、品質面で高評価を頂き住民から信頼を得られたことは、一つの成果と考えられる。

また、当事業の趣旨についても現地保健省スタッフ、住民の方々は十分に理解が浸透しており、塗料でのマラリア対策に興味を抱いていた。また、塗装直後の住民から話を聞くと、「蚊に刺されなくなった。」「蚊が家から居なくなった。」「蚊の死骸が壁際に落ちている。」など効果を出ていることを確認した。

今後、継続してフィールドサーベイやテストを実施し、その効果や持続性、安全性の評価を進めていく。

<成果>

- ・ 3 地区で防蚊塗料 100 軒、一般塗料 100 軒の合計 200 軒の塗装が完了見込みであり、塗装品質についても良好な評価を得られた。
- ・ 住民からも蚊へのノックダウン効果や忌避効果を体感したコメントを頂き、また、NMEC のフィールドテストで蚊のノックダウンが確認され、防蚊塗料の性能が発揮されていることを確認した。

4.3. 第3回現地活動(2018年1月13日～19日)

4.3.1. 本活動の要旨

第3回現地活動では、防蚊塗料のフィールドサーベイの追加2地区の内のMansa郡において、オリエンテーションと塗装トレーニングを実施することが目的であった。

オリエンテーションでは、本事業の背景、目的を現地ステークホルダー(現地保健省、塗装従事者など)に説明し、共通理解を得ることに主眼を置いた。

塗装トレーニングでは、塗装の素人も多い中、Mansa郡では合計100軒の塗装を実施予定である為、塗装の基本、塗料の役目などから講義し、実際に塗装トレーニングを実施することにより、問題の無い塗装ができるよう講習を実施した。

今後、2月半ばまでに塗装を完了し、2月末よりフィールドサーベイが開始予定。

4.3.2. 主な活動:Mansa郡でのオリエンテーション、塗装トレーニングの実施

<目的>

Mansa郡でフィールドサーベイが実施できるよう、本事業の概要説明を実施し、共通理解を図る。また、塗装トレーニングを実施し、フィールドサーベイ実施にあたり問題の無い塗装品質が保てるよう、塗装指導を実施する。塗装ノウハウを得ることで手に職を付け、塗装という仕事に従事できれば、持続可能な社会貢献に繋がると考えます。

<概要>

(参加者) 関西ペイント(株)：山下、水島、 関西プラスコンザンビア社：Mr. Goodson, Ms. Priscilla

・2018年1月15日(月) AM

^ 本事業の概要説明、

^ 防蚊塗料の製品説明

^ 塗料、塗装の基礎知識ガイダンス

・2018年1月15日(月) PM

^ 塗装トレーニング：マスキング、下地調整の実施。

^ 上塗り塗料の塗装：ローラー塗装～刷毛塗装(1回目)

・2018年1月16日(火)

^ 上塗り塗料の塗装：ローラー塗装～刷毛塗装(2回目)

^ オリエンテーションの総括、認定証授与

参加人数も約100名超で塗装の素人も多かったが、非常に活発なオリエンテーションを実施でき、塗装トレーニングについて班毎に実際にロッジのロビーを塗装し、実体験を通じた有意義なトレーニングを実施することができた。

写真：Mansa 郡でのオリエンテーション、塗装研修の様子



<成果>

- ・ 塗装トレーニングに目処が立ち、1月末より塗装を開始予定。(防蚊塗料／一般塗料=50軒／50軒)
- ・ 防蚊塗料についての知識も習得し、及び塗料、塗装の基礎知識を習得することにより、現地で塗装工の仕事に従事することにも期待。

4.4. 第4回現地活動(2018年2月13日～17日)

4.4.1. 本活動の要旨

追加2地区のサーベイ準備状況の確認とAMPの上市に向けた進め方の協議が主な活動内容となった。及びザ国MOH幹部との面会、JICAザンビア事務所へ訪問しプロジェクト状況を共有した。

当初3地区のサーベイが順調に進んでいること、追加2地区のサーベイ準備も順調に進んでおり、2月末からサーベイを開始できる見込みとなった。

及びサーベイも順調にいることから、AMPの上市をサーベイの6ヵ月後の見解を元に判断することで合意が得られた。

4.4.2. 主な活動:ザ国 MOH プロジェクトメンバーとの meeting

<目的>

サーベイ状況の共有化と AMP の早期上市に向けての調整

<概要>

サーベイの課題整理と AMP 上市に向けた進め方の協議

<成果>

- ・当初設定 3 地区、並びに追加 2 地区についても順調に推移していることを共有した。追加 2 地区については、2 月末よりサーベイを開始することで共有した。
- ・フィールドサーベイにおける旅費の扱いについては、3.3. で記載した JICA ザンビア事務所との協議内容を共有した。
- ・フィールドサーベイの 6 ヶ月後の見解を元に、AMP 上市に関わる判断を実施し、6~7 月に上市をすることで合意を得られた。

4.5 第 5 回現地活動(2018 年 5 月 9 日~11 日)

4.5.1 本活動の要旨

5 地区のサーベイ状況の確認と AMP の上市に向けた進め方の協議を MOH 関係者と実施し、サーベイが順調に進んでいること、6 月に 6 ヶ月後のサーベイ結果が得られ、特に問題が無ければ上市準備を進め、9 月頃の上市となることを共有した。

その他、JICA 事務所を訪問しプロジェクト進捗状況の共有、上市に向けた社内協議(KPAL 社、KPZL 社)を実施した。

4.5.2. 主な活動:ザンビア国保健省プロジェクトメンバーとの打合せ

<目的>

早期の上市に向けて、MOH 関係者との調整

<概要>

当事業の進捗状況の共有と今後の進め方協議

<成果>

- ・当初設定 3 地区(Mukusi、Kapiri、Siavonga)、並びに追加 2 地区(Mansa、Petauke)についても順調に推移していることを共有した。3 地区は 5 月度に 6 ヶ月目のサーベイ、2 地区は 3 ヶ月目のサーベイを実施している。現在のところサーベイ結果も良好であるとの言質を頂いた。
- ・NHRA、NMEC の 5 月フィールドサーベイを踏まえ 6 月 15 日に 6 ヶ月のサーベイ結果まとめ報告が実施される予定。報告書内容に問題が無ければ、AMP の製造、販売を本格的に進める。市場への展開は 9 月の予定であることを報告した。

4.6. 第6回現地活動(2018年10月29日～11月2日)

4.6.1. 本活動の要旨

フィールドサーベイ地区のAMP塗装後の状況確認(Mansa郡訪問)では、サーベイ被験者から、「施工前10匹以上いた蚊が施工後はいなくなり、窓、ドアを開放したままで生活できるようになった。」「施工前は、家族の内2名がマラリアになり、莫大な治療費用がかかっていたが、施工後は家族内ではマラリアにかかっておらず、大変感謝している。」などAMPに対し具体的な評価も得られ、順調に推移していることを確認した。また、ルサカにおいて既に販売店で販売を開始しており、順調な滑り出しとなった。

4.6.2. 主な活動:Mansa郡AMP施工家屋住民との面談

<目的>

日本へ現地状況のフィードバックを行うため、AMP塗料施工家屋へ直接赴きヒアリング実施。

<概要>

Mansa地区では、9ヶ月前にAMP塗料を50軒、一般塗料を50軒の計100軒に塗装を実施しており、今回AMP塗料施工2軒の家屋と面談、ヒアリングを実施した。

<成果>

住人の主なコメントは以下の通り。

- ・ 施工前10匹以上いた蚊が施工後はいなくなり、窓、ドアを開放したままで生活できるようになった。
- ・ 施工前は、家族の内2名がマラリアになり、莫大な治療費用がかかっていたが、施工後は家族内ではマラリアにかかっておらず、大変感謝している。
- ・ 施工後2日間のみ塗料の強い臭気があったが、その後は臭気も無く、また副作用も無く、快適に生活できている。

両家族ともに、AMP塗料への高い評価となった。

写真：Mansa郡対象家屋の様子と販売店への訪問



4.7. NHRA、NMEC によるレポート概要

<実施結果報告概要> *3 添付資料：Anti-Mosquito Paint Study Preliminary Report

【目的】

1. 定期的な昆虫学的評価を通じて、24 か月間の AMP の「ロックダウン能力」の効果維持性を評価すること
2. AMP の使用に関連する有害事象を評価すること（安全性評価）
3. 24 か月の期間内の研究群間のマラリア発生率と症状の違いを判断すること

【実施内容】

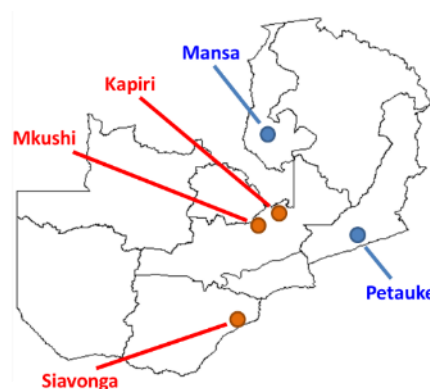
1. 実施地域と実施期間

○ザンビア共和国の5つの地域で AMP の安全性、効果維持性等について実際の家屋に AMP 及びコントロール塗料を塗装し、確認した。先行して2017年11月から3地域において2年間、2018年2月から追加で2地域において1年間サーベイを実施した。

○Kapiri Mposhi、Mkushi、Siavonga（2017年11月～2019年11月）

○Petauke、Mansa（2018年2月～2019年2月）

area	AMP	control
Kapiri	30	30
Mkushi	30	30
Siavonga	40	40
Mansa	50	50
Petauke	50	50
total	200	200



2. 評価内容

① 安全性評価（Safety Assessment）

リサーチチームはその期間中に5回の安全性評価を行った。これらの評価は塗装後、0か月、3か月、6か月、12か月及び24か月に行われた。本サーベイに参加している世帯員への悪影響や疾患等があったかどうかを判断するために行われ、それら全ての疾患等は最寄りの医療施設、地区医療担当官へ報告された。

② 昆虫学的評価（Entomological Assessment）

昆虫学的評価は、5つの全ての地区において安全性評価と同じ期間に実施された。昆虫学的モニタリングの目的は AMP の残留効果を確認することである。また昆虫学評価は、AMP 塗布エリアとコントロールエリアから採取された蚊を用いて、Bio-Assay（コーン試験）により評価された。その評価時期は塗布後1か月、2か月、3か月、6か月、12か月及び24か月で、ランダムに選択された AMP 塗布家屋及びコントロール家屋の各々3世帯で行われた。試験後の蚊については、砂糖水の入ったカップに入れ、加湿コントロールされた日陰で24時間観察され、その死亡率を確認した。

蚊の収集については、CDC (Center for Disease Control and Prevention) ライトトラップを用いて、AMP 塗布エリアとコントロールエリアの両方で屋内の蚊を捕獲した。このトラップは毎月ランダムに選択された 15 世帯に設置され、コミュニティヘルスワーカー (CHW) により収集、保管される。通常蚊の収集は午前 7 時に実施され、National Malaria Elimination Center (NMEC) で昆虫学検査技師により分類される。雌の蚊については、さらに未摂食、摂食又は妊娠のいずれかの採血段階に分類され、昆虫学的評価に用いられる。

3. 結果

① 人口統計

24 か月の安全性評価の期間で、Kapiri (57 人)、Mkushi (70 人) 及び Siavonga (46 人) の 3 地区において合計 173 人に対しインタビューが行われた。表 1 は調査時の主要回答者の社会人口学的特性を示している。

Table 1. Sociodemographic Characteristics of Respondents, Month 24

Variable	Overall
Age of Respondent (mean, SD)	37.7(11.4)
Gender of Main Respondent, n (%)	
Male	81(46.8)
Female	92(53.2)
Relationship to Head of Household	
Head of household	95(54.9)
Spouse	55(31.8)
Son	5(2.9)
Daughter	8(4.6)
Other Relative	10(5.8)
Province (District), n (%)	
Kapiri Mposhi	57(32.9)
Mkushi	70(40.5)
Siavonga	46(26.6)
Total	173(100)

173 人の参加者のうち 69.9%が家の塗装後に殺虫剤残留スプレー (IRS) を含む化学物質を使用していないと回答した。

また Mansa (93 人) 及び Petauke (91 人) 地区における 12 か月の安全性評価期間で合計 184 人対し、同様のインタビューが行われた。(表 2)

Table 2. Sociodemographic Characteristics of Respondents, Month 12

Variable	Overall
Age of Respondent (mean, SD)	38.8(13.1)
Gender of Main Respondent, n (%)	
Male	73(39.7)

Female	111(60.3)
Relationship to Head of Household	
Head of household	83(45.1)
Spouse	63(34.2)
Son	13(7.1)
Daughter	19(10.3)
Brother	1(0.54)
Other Relative	5(2.7)
Province (District), n (%)	
Eastern (Petuake)	91(49.5)
Luapula (Mansa)	93(50.5)
Total	184(100)

184 人の参加者のうち 98.9%が家の塗装後に殺虫剤残留スプレー（IRS）を含む化学物質を使用していないと回答した。

② 安全性評価 (Adverse Effects)

② -1：前回 12 か月でのサーベイからの影響について

Table 3. Adverse Effects Experienced since Last Survey

Ill Since Last Survey	Intervention, n (%)	Control, n (%)	Total
No	60(77.9)	82 (82)	142 (82.1)
Yes	17 (22.1)	14 (14.6)	31 (17.9)
Total	77(100.00)	96 (100.00)	173 (100.00)

表 3 は、Kapiri、Mkushi 及び Siavonga 地区についてであるが、前回 12 か月でのサーベイ以降に悪影響があったかどうかをインタビューした結果である。AMP 塗布家屋では 77.9%、コントロール家屋では 82.0%が病気等の症状にならなかったと回答している。また表 4 には、塗装後に何らかの影響があったと回答した 31 人のうち、表 4 に示す症状に『YES』と回答した人全員がその症状に対する薬物治療を受けたとしている。

Table 4. Adverse Effects since Painting, Month 24

Symptoms	Intervention	Control	Total
Allergic/Immunological			
Rash	2(50)	2(50)	4(100)
Sneezing	8(72.7)	3(27.3)	11(100)
Redness of Skin	1(100)	-	1(100)
Cardiac			

Palpitation	-	-	-
Swelling of limbs	-	-	-
Hypotension	-	-	-
Hypertension	-	-	-
General			
Fatigue	3(37.5)	5(62.5)	8(100)
Fever	9(50)	9(50)	18(100)
Headache	9(50)	9(50)	18(100)
Insomnia	-	2(100)	2(100)
Chills	2(33.3)	4(66.7)	6(100)
Sweating	5(62.5)	3(37.5)	8(100)
Dermatologic			
Dry skin	-	-	-
Itchy skin	4(80)	1(20)	5(100)
Ear/Nose/Throat			
Voice change	4(80)	1(20)	5(100)
Hearing loss	1(100)	-	1(100)
Eyes/Ophthalmologic			
Redness of eyes	-	-	-
Tearing	1(100)	-	1(100)
Blurring of vision	-	-	-
Gastrointestinal			
Poor appetite	-	-	-
Constipation	4(80)	1(20)	5(100)
Heart burn	1(50)	1(50)	2(100)
Nausea	1(100)	-	1(100)
Musculoskeletal			
Leg crAMPs	-	2(100)	2(100)
Leg pain	1(100)	-	1(100)
Neuropsychiatric			
Mood alternation	-	-	-
Dizziness	-	-	-
Fits	-	2(100)	2(100)
Pulmonary	-	-	-
Asthma	-	-	-
Cough	8(50)	8(50)	16(100)
Difficult breathing	-	-	-

また Mansa、Petauke 地区における同様の影響があるかどうかの調査結果を表 5 に、また家屋への塗装後にどのような症状がでたかを表 6 に記す。

Table 5. Adverse Effects Experienced since Last Survey

	Ill Since Last Survey	Intervention, n (%)	Control, n (%)	Total
	No	90(93.7)	80 (91)	170 (92.4)

Yes	6 (6.3)	8 (9)	14 (7.6)
Total	96(100.00)	88 (100.00)	184 (100.00)

Table 6. Adverse Effects since Painting, Month 12

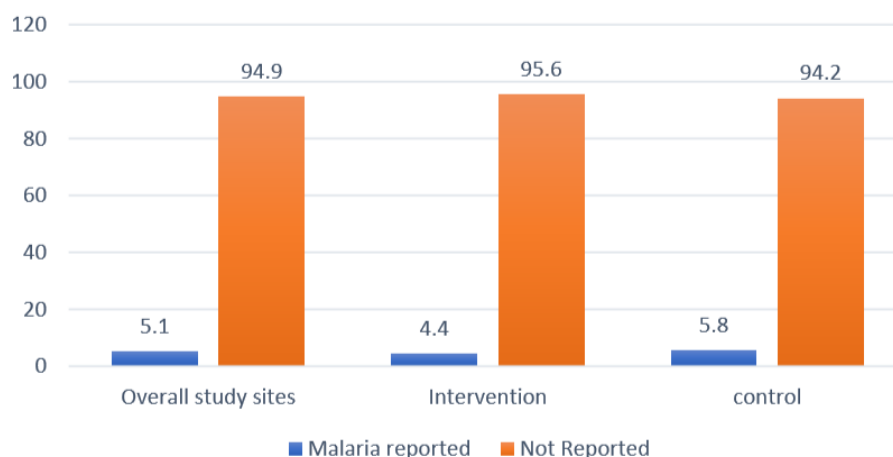
Symptoms	Intervention	Control	Total
Allergic/Immunological			
Rash	0	1(100)	1(100)
Sneezing	3(60)	2(40)	5(100)
Redness of Skin	-	-	-
Cardiac			
Palpitation	-	-	-
Swelling of limbs	-	-	-
Hypotension	-	-	-
Hypertension	-	-	-
General			
Fatigue	3(42.9)	4(57.1)	7(100)
Fever	4(50)	4(50)	8(100)
Headache	4(44.4)	5(55.6)	9(100)
Insomnia	1(100)	-	1(100)
Chills	2(100)	-	2(100)
Sweating	2(50)	2(50)	4(100)
Dermatologic			
Dry skin	1(100)	-	1(100)
Itchy skin	-	-	-
Ear/Nose/Throat			
Voice change	-	-	-
Hearing loss	-	-	-
Eyes/Ophthalmologic			
Redness of eyes	-	-	-
Tearing	-	-	-
Blurring of vision	-	-	-
Gastrointestinal			
Poor appetite	-	-	-

Constipation	1(50)	1(50)	2(100)
Heart burn	-	1(100)	1(100)
Nausea	-	-	-
Musculoskeletal			
Leg crAMPs	-	1(100)	1(100)
Leg pain	-	-	-
Neuropsychiatric			
Mood alternation	-	-	-
Dizziness	-	-	-
Fits	-	1(100)	1(100)
Pulmonary	-	-	-
Asthma	-	-	-
Cough	2(33.3)	4(66.6)	6(100)
Difficult breathing	-	-	-

AMP 塗布家屋においては 93.7%、コントロール家屋については 91%が前回調査以来、病気等にはならなかったと回答した。また表 6 には、塗装後に何らかの影響があったと回答した 14 人の症状を示したのものである。表 6 の症状に『YES』と回答した全員がその症状に対する薬物治療を受けたとしている。

② -2 : マラリアの症例について

マラリアの症例は、報告された診断および世帯主によって報告された患者に投与された薬物に基づいて推定された。以下の図は、AMP 塗布家屋及びコントロール家屋での自己報告によるマラリア症例の比較を示す。この結果から全体の 5.1%の世帯がマラリアの症例を報告しており、AMP 塗布家屋では 4.4%、コントロール家屋では 5.8%であった。この両者におけるマラリア症例に統計的な差はなかった。



(図) AMP 塗布家屋及びコントロール家屋におけるマラリア症例の比較

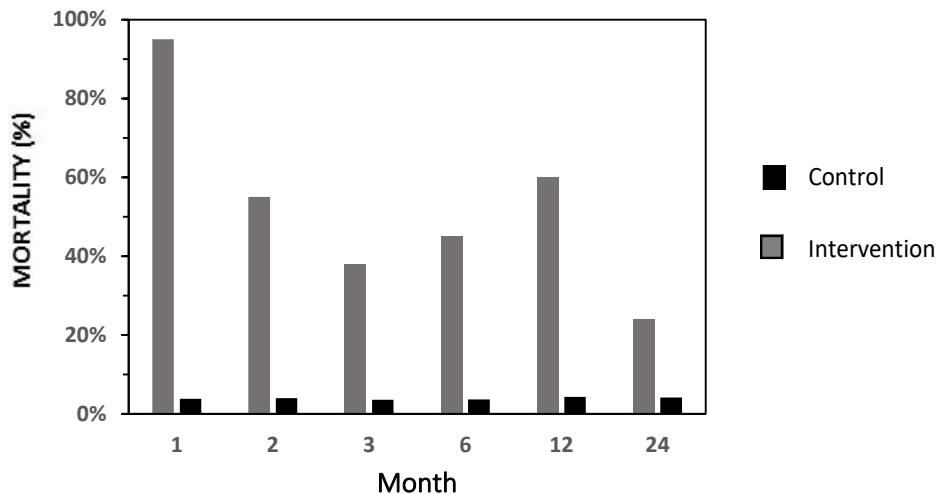
Malaria			
	Reported	Not Reported	Total
Intervention	8(42.1%)	173(49.3%)	181(48.9%)
Control	11(57.9%)	178(50.7%)	189(51.1%)
Total	19(100%)	351(100%)	370(100%)

③ 昆虫学的評価結果

5つの地区すべてでハマダラカ (*Anopheles*) が室内で捕獲されてはならず、従って全ての分析はアカイエカ (*Culex*) で行われた。殺虫剤耐性モニタリングについては十分なサンプルが捕獲出来ておらず、この時点においては意味のある議論ができない。引き続き National malaria Elimination プログラムに基づき継続される。

③ -1 : Siavonga

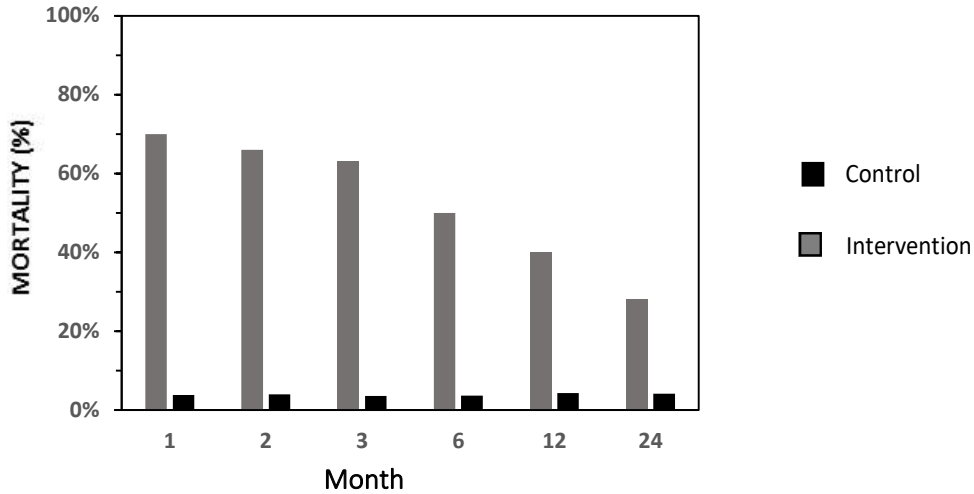
Siavonga 地区では、屋内では蚊が捕獲されなかったため、AMP 塗布家屋とコントロール家屋における蚊の室内滞在密度の比較はできないが、コーン試験による致死率は、1か月で95%、2か月で75%、3か月で55%、6か月で38%、12か月で60%及び24か月で24%であった。



(図1) Siavonga での AMP の残存効果

③ -2 : Mkushi

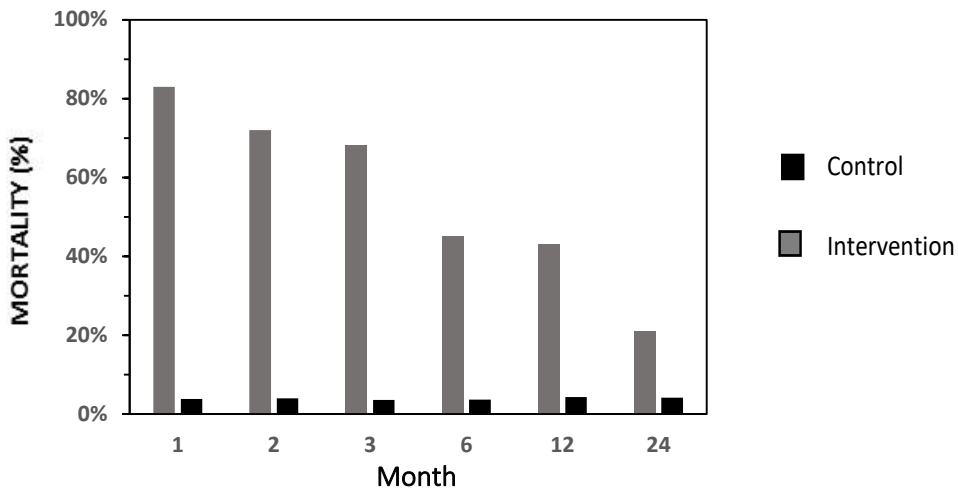
Mkushi 地区では合計 223 匹の蚊が室内で捕獲され、AMP 塗布家屋とコントロール家屋において有意差が認められた。AMP の残存効果は1か月で83%、2か月で72%、3か月で68%、6か月で45%、12か月で43%及び24か月で28%であった。



(図 2) Mkushi での AMP の残存効果

③ -3 : Kapiri・Mposhi

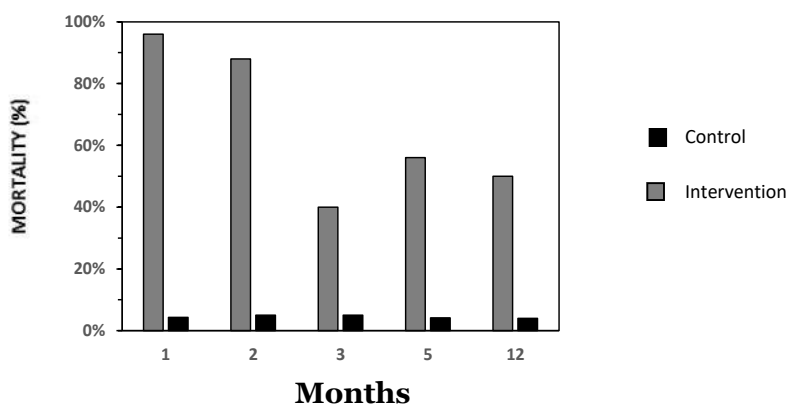
Kapiri・Mposhi 地区では室内で 371 匹の蚊が捕獲され、ここでも同様のパターンが観測され、AMP 塗布家屋とコントロール家屋とで有意差があった。AMP の残存効果は 1 か月で 83%、2 か月で 72%、3 か月で 68%、6 か月で 45%、12 か月で 43%、そして 24 か月では 21%となった。



(図 3) Kapiri・Mposhi での AMP の残存効果

③-4 : Mansa

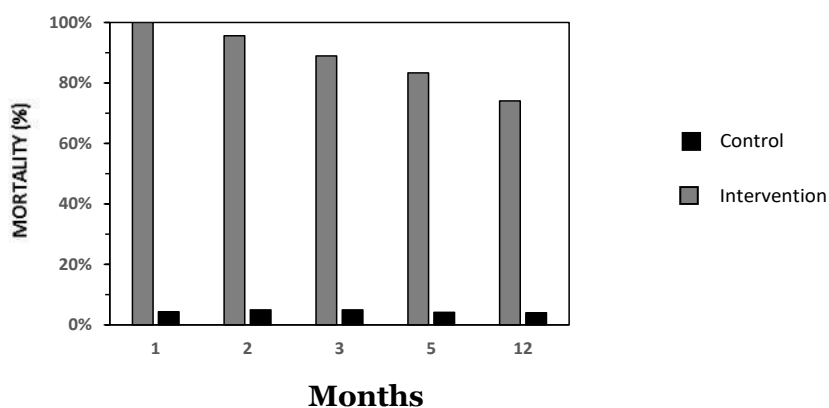
AMP 塗布家屋とコントロール家屋の両方において 288 匹の Culex が捕獲され、AMP の残存効果は 1 か月で 96%、2 か月で 88%、3 か月で 40%、5 か月で 56%及び 12 か月で 50%であり、両エリア間で、室内で捕獲した蚊ではあるが、有意差が認められた。



(図 4) Mansa での AMP の残存効果

③ -5 : Petauke

AMP 塗布家屋とコントロール家屋の両方において 434 匹の Culex が捕獲された。この地区における致死率は評価期間を通し、並外れて高かった。AMP の残存効果は 1 か月で 100%、2 か月で 95%、3 か月で 84%、5 か月で 83%及び 12 か月で 74%であった。両エリア間で、有意差が認められた。



(図 5) Petauke での AMP の残存効果

④ 結論と今後

○安全性評価

- ・ 安全性評価面で大きな悪影響はみられなかった。理由として、AMP 塗布エリアとコントロールエリアとで報告された症状に違いはなく、AMP に関連する症状を他の環境要因または生物学的要因と関連付けることはできない。

○昆虫学的評価

NMEC による昆虫学的評価 (Bio-Assay) から以下のことが分かった。

- 特筆すべきことは、AMP エリア、コントロールエリア共にハマダラカ (Anopheles) が捕獲出来なかった。このことは塗料の忌避、刺激効果による可能性がある。
- AMP の効果維持性は Petauke 地区を除く 4 地区全てにおいて WHO が定める 80%の致死率を 6 か月で下回っていた。Petauke は 12 か月でも 80%程度ある。
- しかしながら AMP 塗布エリアは 5 地区全てにおいて、アカイエカ (Culex) の室内滞在密度を減らし、またハマダラカは捕獲されなかった。
- AMP 塗布エリアとコントロールエリアでの昆虫学的評価の絶対値の違いはあるが、マラリア症例での統計的な違いは両者にはなかった。
- Kansai Plascon においては、耐性蚊を低減すべく次世代の殺虫剤を使った塗料配合を探索する必要がある。他の代替案としては、ザンビアへ広く拡げるべく、耐性メカニズムに基づく酵素の作用、効果を高める方法として、ピレスロイドとともに PBO の使用も含む。
- そしてより持続性を確保するための強化された樹脂を調整するなど必要になるかもしれない。

第5章 本事業の総括（実施結果に対する評価）

5.1. 本事業の成果（対象国・地域・都市への貢献）

本事業を通し、MOH、MOH 関係機関、各地域の政府機関、塗装業者、各地域のサーベイ被験者の方々などに AMP の効果、有用性、安全性の理解を得られ、マラリア対策塗料として認可された。

大きな成果として、AMP のサーベイ結果を元に、MOH が AMP に対してマラリア対策として大きな期待を持ち、また安全性評価においても AMP に因る悪影響は見られないとの判断の元、サーベイ期間満了の2年を待たずに6か月のサーベイ結果を元にマラリア対策塗料として認可する結果となった。これは少しでも早く上市することにより、マラリアに苦しむ人々に早く製品を供給することを優先するというポリシーの元に判断されたことであり画期的なことである。

5.2. 本事業の成果（ビジネス面）、及び残課題とその解決方針

5.2.1. 本事業の成果（ビジネス面）

前倒しで MOH より認可されたことはビジネス面にとっても非常に大きな成果であった。2017年11月に本事業を開始し、その1年後の2018年10月1日に AMP の上市セレモニーを開催することができた。

当式典には、ビンセント・ムワレ地方行政大臣、ケネディ・マラマ保健省事務次官、側嶋秀展ザンビア日本国特命全権大使、JICA ザンビア事務所花井淳一所長、当社社長の石野博を始め、150人以上が参加した。

式典では、AMP の発表（テープカット）及びスピーチ実施者らによる塗布のデモンストレーションが行われた。ムワレ地方行政大臣からは、『防蚊塗料がマラリアに悩まされる人々の生活を改善する一助になることへの期待』、花井所長からは、『保健省、関係機関へ、防蚊塗料の今後の販売普及のための更なる協力要請』、石野からは、『当社が創立100周年を迎えた今年、防蚊塗料の販売開始という大目標を達成できたことに対する喜びと、本製品がザンビアのみならずアフリカ、ひいては世界のマラリア撲滅に寄与することへの願い、また JICA、ザンビア政府機関への謝辞』が述べられた。

写真：AMP 上市セレモニーの様子



上市後の売上実績では、2019年10月までの売上実績で、（非公開）を計上し、新製品としては好調な売上となった

5.2.2. 課題と解決方針

現在、既に B to B（及び B to G）ビジネスに留まらず、B to C（to MARKET）へのビジネスも始めている。製品の流通により市場での評価を高め、及び CSR、展示会、販促機会などを通して AMP の魅力を伝えていきたい。

写真：ディーラーでの販促会、宣伝広告の様子



写真：WORLD MALARIA DAY AND NATIONAL HEALTH WEEK



写真：CSR活動(小学校や病院への無償塗装)



このように AMP を通しての営業活動、社会貢献などにより、会社の認知度、業績も伸ばし当社事業を維持させ、雇用面、経済面でも社会、政府に持続的な貢献ができるよう、継続的にサポートしていくことが、今後の課題だと考える。

第6章 本事業実施後のビジネス展開の計画

6.1. ビジネスの目的及び目標

非公開

6.2. ビジネス展開計画

6.2.1. ビジネスの概要

非公開

6.2.2. ビジネスのターゲット

非公開

6.2.3. ビジネスの実施体制

非公開

6.2.4. ビジネス展開のスケジュール

非公開

6.2.5. 競合の状況

非公開

6.2.6. ビジネス展開上の課題と解決方針

非公開

6.2.7. ビジネス展開に際し想定されるリスクとその対応策

非公開

6.3. ODA 事業との連携可能性

6.3.1 連携事業の必要性

非公開

6.3.2. 想定される事業スキーム

非公開

6.3.3. 連携事業の具体的内容

非公開

添付資料

*1 Technical design sheet of AMP

*2 Safety Data sheet

*3 Anti-Mosquito Paint Study Preliminary Report

AMP 開発活動に関わる社外発表など

1. 2017年10月 スペイン SOVE学会 村松

⇒米国農務省と共同で発表

2. 2018年5月 日本 関西ペイント創立100周年記者会見 石野

⇒JICA 民間技術普及事業中間報告

3. 2018年10月 アメリカ SOVE学会 永野

⇒JICAの活動についてポスターセッションで発表

4. 2019年4月 日本 青山学院大学 春季公開講座 永野

⇒民間企業の感染症予防への取り組みについて発表

5. 2019年3月 日本 大阪グランフロント 関西企業交流会 忽那

⇒JICA活動について報告

6. 2019年7月 日本 大阪グランフロント 関西マスコミ勉強会 忽那

⇒JICA活動について報告

7. 2019年8月 日本 JICA地球広場 関連イベント 山下

⇒JICA官民連携プロジェクト：ザンビアでの防蚊塗料の普及促進について

8. 2019年9月 日本 ラジオニッポン「薬師丸ひろ子ハード・デリバリー」

⇒当社防蚊塗料開発の経緯、アフリカでの反響について

9. 2019年8月 日本 NEWS WEB内『カメラマンズアイ』

10月 NHKワールドWEBサイト内 「At a Glance」

NHKワールドFacebook twitter

NHKワールドWEBサイト内 「Backstories」

⇒8月TICAD7に合わせ、当社がJICAとの協力のもとアフリカで展開する防蚊塗料「Anti Mosquito Paint」を中心に紹介

10. 2019年10月 日本 NHK関西 ルソン壺 赤木、山下

⇒ウガンダでの関西ペイントの進出状況及び防蚊塗料の販売取組みについて

Republic of Zambia
Ministry of Public Health

Collaboration Program with the Private Sector
for Disseminating Japanese Technology
for Anti-Infection Paint

February 2020

JICA

Kansai Paint Co., Ltd.

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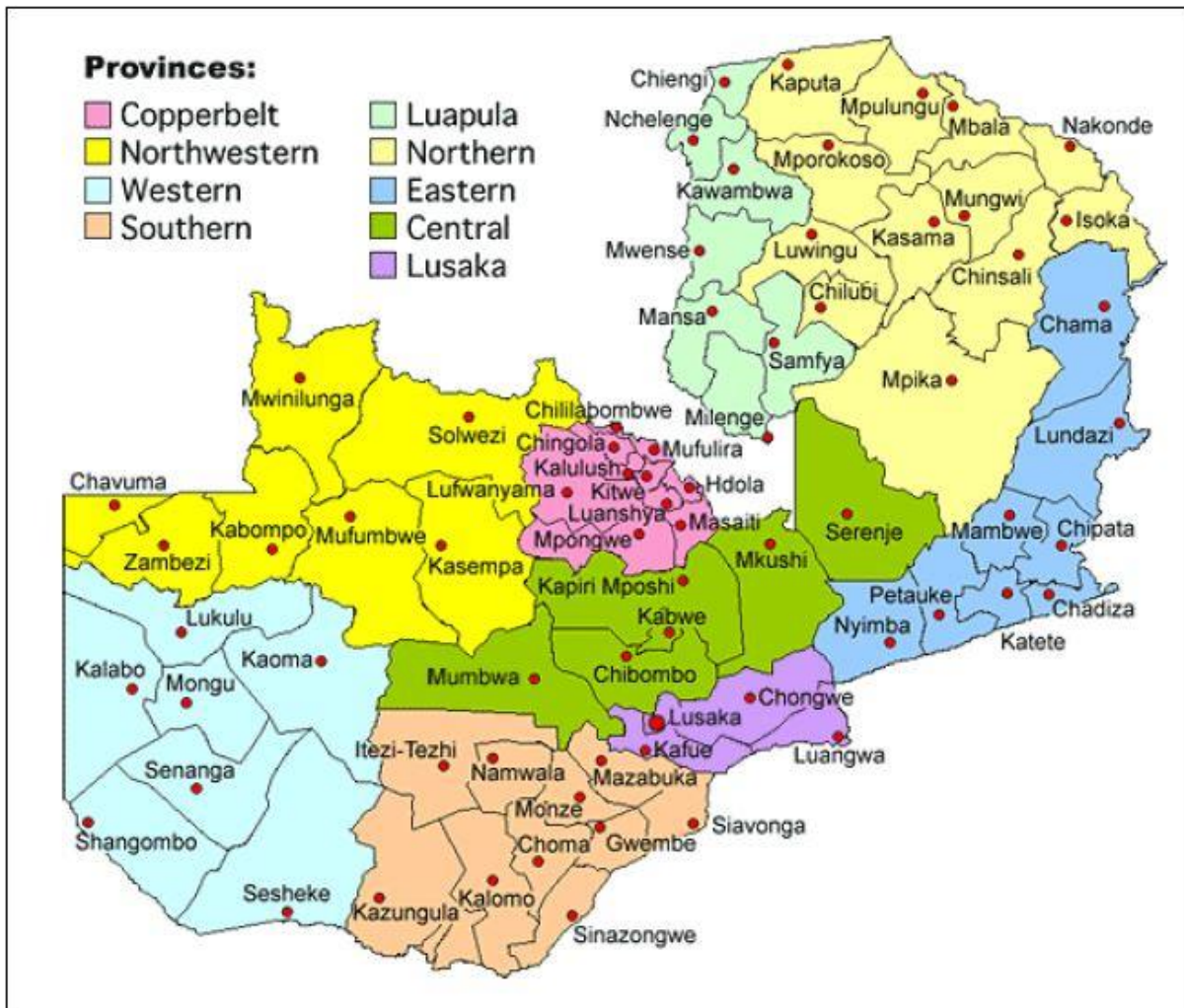
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MAP



Chapter 1 SUMMARY

The project aims to prevent malaria by applying anti-mosquito paint (hereinafter referred to as AMP) to living spaces with a functional paint that repels mosquitoes developed by Kansai Paint (hereinafter referred to as KP). The aim is to improve the livelihood and health of people in infected areas and promote social contribution activities and economic activities in the local area.

Approximately 40% of people in Zambia are infected with malaria each year and many of them die, placing a heavy burden on Zambia's healthcare system, and have a huge human and financial impact. Serious damage. The Ministry of Health (hereinafter referred to as MOH) has set a major goal of eliminating malaria by 2021, and this initiative has supported the promotion of this project.

The following two points have been set as the major goals of this project.

- 1) Verify and evaluate the usefulness (safety and effect) of AMP as a preventive measure against malaria and obtain AMP product approval.
- 2) After obtaining marketing authorization, establish sustainable business activities that take social contribution and business into consideration.

The outline of the results is as follows, and refer to the detailed explanation of this report.

- 1) With the cooperation of JICA and the MOH, the target paint was applied to 400 ordinary houses in malaria-infected areas, and a demonstration test was started in November 2017.

As a result, in the safety evaluation, there was no difference in the symptoms reported between the AMP application area and the control area, and it was concluded that no adverse effects due to AMP were observed. As for the effect, a remarkable difference was confirmed between the AMP application area and the control area in the entomological evaluation (corn test). In all five areas, both the AMP application area and the control area, the indoor stay density of *Culex pipiens* was reduced, and *Anopheles* could not be captured. It can be said that this may be due to the repellent and irritating effects of the paint.

Paints containing mosquito repellents had not been approved and the method of approval had not been clearly defined. However, the above verification test results were evaluated by the MOH in Zambia. Six months after the start of the verification test, the product was approved by MOH.

- 2) Through this project, we have obtained marketing authorization for AMP in Zambia and started selling it in October 2018. Sales promotion activities have earned a high reputation in the country. In the future business development, the goal is to sell 100 KL annually in the country in three years, and based on the know-how gained through this project, plans to expand into malaria-focused areas mainly in East Africa. We were able to expand in Uganda and we will continue to expand our business in Kenya and Tanzania.

Chapter 2 Background of this project

According to the Zambia National Health Strategic Plan 2011-2015, the country's medical standards are not yet enough, and the country is facing major threats from malaria and other infectious diseases such as respiratory tract infections, HIV / AIDS, tuberculosis and sexually transmitted diseases. Reducing these diseases is one of the major health administration issues.

The Ministry of Foreign Affairs' diplomatic mission abroad information indicates that there is a shortage of medical supplies and medical equipment in addition to a shortage of doctors and nurses, and that it is one of the African countries with particularly poor medical conditions. It is very bad, and many oral infections such as cholera and dysentery occur every year. In addition, the number of infant deaths per 1,000 people is high at 43 (2 in Japan according to WHO 2015 data), and improving maternal and child health is also a major issue.

Although the country is working to improve this situation, effective measures to control the risk of infectious diseases over the long term, economically, remain insufficient.

Zambia belongs to the tropical region, and although it is mostly a plateau with a temperate humid climate and tropical savanna climate, the lowest temperature is around 5 °C in the coldest June and the highest temperature is around 33 °C in the hottest October. It is a popular area of fever malaria. Due to the high altitude in the capital city, Lusaka, malaria transmission rates are lower than in rural areas, but patients are present throughout the year. As of 2005, there were 383 cases / 1,000 people, and in 2010, 246 cases / 1,000 people, which accounted for 40% of medical facility visits. Therefore, the country has a vector that includes insect repellent nets and indoor insect repellent application. Three areas around the country, centering on controls ① Lusaka area, ② Areas where the risk of infection for young people is about 10% (Central, Copperbelt, Northwestern, Southern, and Western Provinces) ③ 20% risk of infection for young people We are working on malaria control by dividing the area into several areas (Eastern, Luapula, and Northern Provinces).

The Government of Zambia is also actively involved in the eradication of malaria, and is promoting the "National Malaria Elimination Strategic Plan 2017-2021" led by the MOH of Zambia, and has a strong interest in vector control. Against this background, this has been a tailwind in promoting this business.

Reference site <https://www.NMEC.org.zm/malaria-elimination-strategic-plan>

Despite improvements in the country, malaria has infected about 6 million people and killed more than 3,000 as of 2014. At present, mosquito nets, indoor spraying of insecticides, and administration of preventive drugs to pregnant women are main solutions. However, mosquito control measures by AMP cover the entire painted living space and provide full support for 24 hours. Thus, it is expected that a great effect can be obtained.

It is estimated that about 40% of malaria-infected persons are treated at public healthcare institutions, which places a heavy human and economic burden on the healthcare system in the country. If the promotion of AMP could prevent malaria infection and reduce medical costs in Zambia, it would be able to use the budget to strengthen the fragile health system in Zambia, such as maternal healthcare.

Chapter 3 Outline of this project

1. Purpose of the project

Based on our corporate philosophy of contributing to society through the coatings business, we aim to develop new markets with functional coatings, further contribute to people's lives and health, and promote economic activities and employment locally. It is our philosophy.

This time, as a countermeasure against infectious diseases that spread in the country, we proposed this project with the aim of linking to effective preventive measures. Also, mosquito repellent paints may contain insect repellents, giving due consideration to safety and environmental impacts, and consulting with the Ministry of Health of the Nation to avoid adverse effects on people and the environment. We want to make sure that we take all possible precautions.

2. Goals of this project (contribution to development issues in target countries / regions / cities)

To reduce the disease burden of infectious diseases by demonstrating the effectiveness of infection control paints in preventing infection and linking them to practical use.

AMP is expected to contribute to malaria prevention measures. In the situation where malaria has seriously affected infants and pregnant women and about 3000 people die annually, therefore in addition to the existing measures, interior paint cover the entire painted living space and do not require complicated procedures.

3. Achievements of this project (business side)

-To enable distribution of products that are easy to purchase in terms of price through local manufacturing.

-To develop a business plan in Africa by obtaining marketing permission in Zambia and conducting local promotional activities.

4. Implementation schedule

- Field survey preparation period: September to November 2017
- Field survey period: November 2017 to December 2019

This project is promoted by KPJ, and its subsidiaries, KPAL and KPZL, can provide close support.

The partner MOH of the country and the governmental agencies have a good understanding of this project and have cooperated with the JICA Zambia office to promote the project. In field surveys, a coordinator and a survey team were set up locally, and a system was established that could respond to surveys conducted at multiple sites in Zambia.

- KPJ and South Africa's KPAL, which oversees Africa, have independently implemented business plans and examined paint formulation.
- Attempted local production at KPZL, but the wastewater treatment facilities were not sufficient, and the scheme was to manufacture at KPAL, which has facilities, and export to KPZL. After the project has been successfully spread in the country, KPAL can export it to the CSA region, and it is necessary to obtain approval in each country.
- KPZL, a local subsidiary, will take advantage of its own network to independently implement supply chain construction, product PR activities, and field verification.
- Create a system in which the three companies can work complementarily and organically.

5. Implementation

The objective is to verify and demonstrate the effectiveness and safety of AMP together with MOH in actual field surveys and obtain official approval for product launch from MOH.




Prior to the AMP field survey, a mosquito knockdown test was conducted at the NATIONAL MALARIA ELIMINATION CENTRE (NMEC) laboratory in mid-June 2017 to confirm the effect of AMP, and its knockdown properties were confirmed.

Mosquito knock-down test at NMEC

<Method>After 30 minutes exposed on AMP panel by WHO cone, it is set 24 hours in the cup with sugar.



After 30 minutes later, Almost knock-down.

<Result>	Test-a	b	c	Total
Anopheles	10	10	10	30
After 24 hours (mortality)	10	10	8	28
				93.3% *Criterion : more than 80%.

Afterwards, an application for product registration for mosquito repellent paint was made at Zambia Environmental Management Agency (ZEMA), and registration was completed at the beginning of August. After that, apply for a field survey license to University of Zambia Research Ethics Committee (UNZAREC) and move on to implementation. Below is an overview of the field survey.

<Outline of Mosquito repellent paint field survey>

-Under the cooperation of the MOH, request the general households to cooperate in the target area and apply mosquito-proof paint and a general interior paint, which is a comparison with the mosquito-proof paint. A total of 400 cases were painted.

Painted houses	KAPIRI	MUKUSI	SIAVONGA	MANSA	PETAUKE
Mosquito paint	30	40	30	50	50
General paint	30	40	30	50	<u>50</u>

Initially planned for three districts, but two districts (MANSA, PETAUKE) have been added at the request of MOH.

Conduct a questionnaire by the NHRA (National Health Research Association), and conduct a questionnaire on safety assessment and the presence or absence of malaria. (Survey date: 0, 3, 6, 12, 24 months later)

The NMEC (National Malaria Elimination Center) will conduct a knockdown corn test for mosquitoes designated by WHO for the effectiveness and sustainability of mosquito paints.

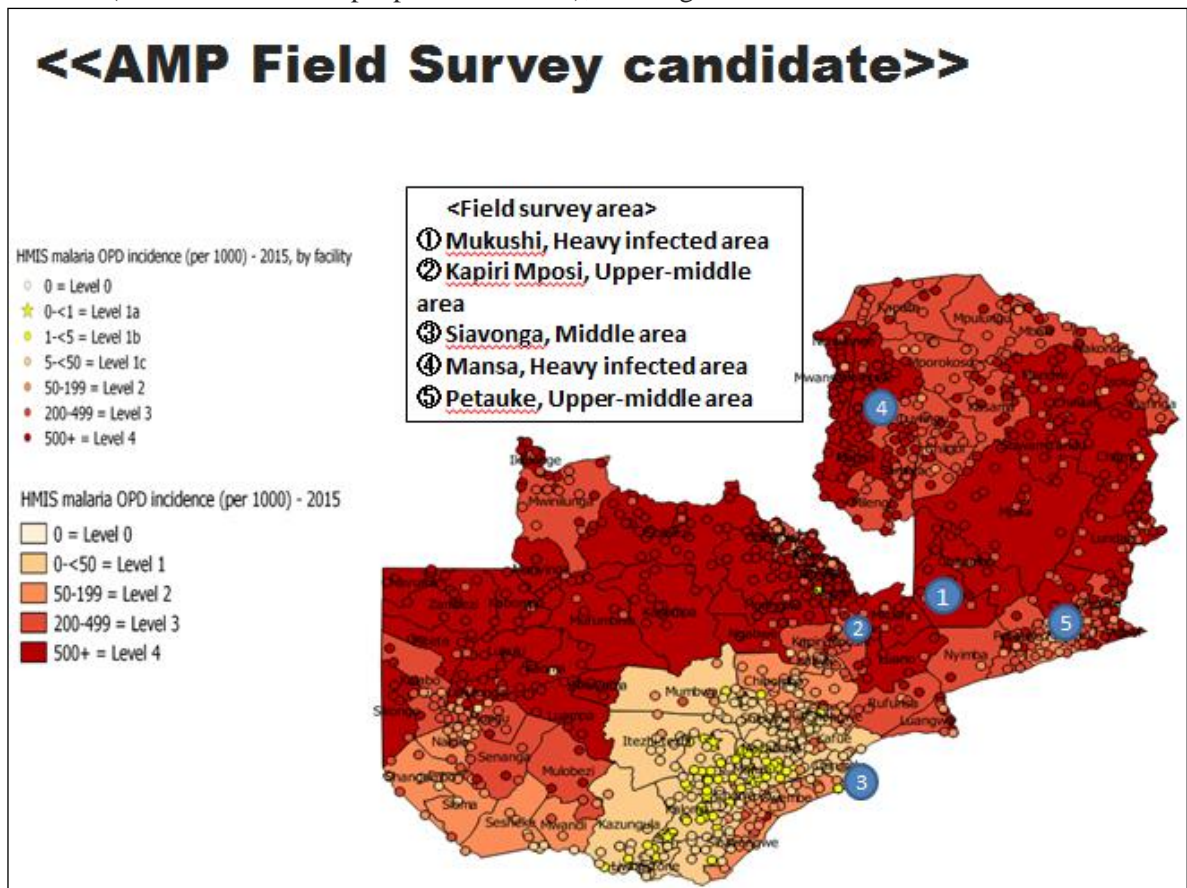
<Mosquito repellent paint: overview of field survey>

- Since malaria is low in Lusaka and its suburbs, it will be implemented in rural areas.
- Malaria-affected areas-severe areas will be divided into three levels and planned to be implemented at five candidate sites.

Level4 (over 500 out of 1,000 people are affected), Mkushi, Mansa

Level3 (200-499 out of 1000 people are affected), Kapiri Mposhi, Petauke

Level2 (50-199 out of 1000 people are affected), Siavonga.



Chapter 4 Outline of Implementation Results of this Project and Outline of Reports by NHRA and NMEC

Photo: Orientation and painting training



Photo: State of target house in Mukusi County

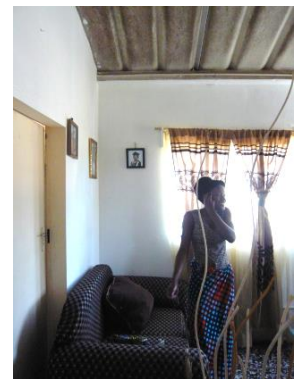


Photo: State of the target house in Kapiri County



Photo: Siavonga County target house



Photo: Orientation and painting training in Mansa County



Photo: State of target house in Mansa County and visit to dealer



Summary of fields survey implementation result report

* Attachment : Anti-Mosquito Paint Study Preliminary Report

【Objectives】

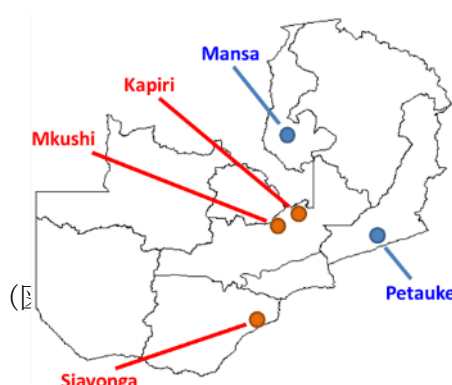
1. To assess the sustainability of AMP's "knockdown ability" for 24 months through regular entomological assessments
2. To assess adverse events related to AMP use (safety assessment)
3. To determine differences in malaria incidence and symptoms between study groups within a 24-month period

【Implementation content】

1. Implementation area and implementation period

- In five regions of the Republic of Zambia, AMP and control paint were applied to actual houses to confirm the safety and maintainability of AMP. Prior to this, a survey was conducted for two years in three regions from October 2017 and for one year in two additional regions from February 2018.
- Kapiri Mposhi, Mkushi, Siavonga (October 2017-October 2019)
- Petauke, Mansa (February 2018-February 2019)

area	AMP	control
Kapiri	30	30
Mkushi	30	30
Siavonga	40	40
Mansa	50	50
Petauke	50	50
total	200	200



2. Evaluation contents

① Safety Assessment

The research team performed five safety assessments during that period. These evaluations were performed at 0, 3, 6, 12, and 24 months after painting. The survey was conducted to determine whether there were any adverse effects or illnesses on household members participating in this survey, and all such illnesses were reported to the nearest medical facility or regional medical officer.

② Entomological Assessment

Entomological assessments were performed at the same time as the safety assessments in all five areas. The purpose of entomological monitoring is to determine the residual effects of AMP. In addition, entomological evaluation was performed by Bioassay (corn test) using mosquitoes collected from the AMP application area and the control area. The evaluation period was 1 month, 2 months, 3 months, 6 months, 12 months and 24 months after application. Three households each is randomly selected AMP

from both applied house and control house. The mosquitoes after the test were placed in a cup containing sugar water, observed for 24 hours in a humidified controlled shade, and the mortality was confirmed.

For mosquito collection, we used a Center for Disease Control and Prevention (CDC) light trap to capture indoor mosquitoes in both the AMP-applied and control areas. The traps are set up in 15 randomly selected households each month and collected and stored by community health workers (CHW). Mosquito collection usually occurs at 7 am and is classified by an entomologist at the National Malaria Elimination Center (NMEC). Female mosquitoes are further categorized as either “unfed”, “fed” or “pregnant” blood sampling stages and used for entomological evaluation.

3. Results

① Demographics

During the 24-month safety assessment, a total of 173 people were interviewed in three districts: Kapiri (57), Mkushi (70) and Siavonga (46). Table 1 shows the socio-demographic characteristics of the main respondents at the time of the survey.

Table 1. Sociodemographic Characteristics of Respondents, Month 24

Variable	Overall
Age of Respondent (mean, SD)	37.7(11.4)
Gender of Main Respondent, n (%)	
Male	81(46.8)
Female	92(53.2)
Relationship to Head of Household	
Head of household	95(54.9)
Spouse	55(31.8)
Son	5(2.9)
Daughter	8(4.6)
Other Relative	10(5.8)
Province (District), n (%)	
Kapiri Mposhi	57(32.9)
Mkushi	70(40.5)
Siavonga	46(26.6)
Total	173(100)

69.9% of 173 participants reported that they did not use any chemicals, including pesticide residue sprays (IRS), after painting their homes.

A similar interview was conducted with a total of 184 people during the 12-month safety assessment period in the Mansa (93) and Petauke (91) districts. (Table 2)

Table 2. Sociodemographic Characteristics of Respondents, Month 12

Variable	Overall
Age of Respondent (mean, SD)	38.8(13.1)
Gender of Main Respondent, n (%)	

Male	73(39.7)
Female	111(60.3)
Relationship to Head of Household	
Head of household	83(45.1)
Spouse	63(34.2)
Son	13(7.1)
Daughter	19(10.3)
Brother	1(0.54)
Other Relative	5(2.7)
Province (District), n (%)	
Eastern (Petuake)	91(49.5)
Luapula (Mansa)	93(50.5)
Total	184(100)

98.9% of the 184 participants said they did not use any chemicals, including pesticide residue sprays (IRS), after painting the home.

② Safety evaluation (Adverse Effects)

② -1 : About the influence from the survey in the last 12 months

Table 3. Adverse Effects Experienced since Last Survey

Ill Since Last Survey	Intervention, n (%)	Control, n (%)	Total
No	60 (77.9)	82 (82)	142 (82.1)
Yes	17 (22.1)	14 (14.6)	31 (17.9)
Total	77 (100.00)	96 (100.00)	173 (100.00)

Table 3 shows the results of interviews on the areas of Kapiri, Mkushi and Siavonga, which have been negatively affected since the last 12 months survey. 77.9% of AMP-applied houses and 82.0% of control houses answered that they did not have any symptoms such as illness. Table 4 also shows that of the 31 respondents who had any effect after painting, all who answered "YES" to the symptoms shown in Table 4 received drug treatment for those symptoms.

Table 4. Adverse Effects since Painting, Month 24

Symptoms	Intervention	Control	Total
Allergic/Immunological			
Rash	2(50)	2(50)	4(100)
Sneezing	8(72.7)	3(27.3)	11(100)
Redness of Skin	1(100)	-	1(100)

Cardiac			
Palpitation	-	-	-
Swelling of limbs	-	-	-
Hypotension	-	-	-
Hypertension	-	-	-
General			
Fatigue	3(37.5)	5(62.5)	8(100)
Fever	9(50)	9(50)	18(100)
Headache	9(50)	9(50)	18(100)
Insomnia	-	2(100)	2(100)
Chills	2(33.3)	4(66.7)	6(100)
Sweating	5(62.5)	3(37.5)	8(100)
Dermatologic			
Dry skin	-	-	-
Itchy skin	4(80)	1(20)	5(100)
Ear/Nose/Throat			
Voice change	4(80)	1(20)	5(100)
Hearing loss	1(100)	-	1(100)
Eyes/Ophthalmologic			
Redness of eyes	-	-	-
Tearing	1(100)	-	1(100)
Blurring of vision	-	-	-
Gastrointestinal			
Poor appetite	-	-	-
Constipation	4(80)	1(20)	5(100)
Heart burn	1(50)	1(50)	2(100)
Nausea	1(100)	-	1(100)
Musculoskeletal			
Leg crAMPs		2(100)	2(100)
Leg pain	1(100)	-	1(100)
Neuropsychiatric			
Mood alternation	-	-	-
Dizziness	-	-	-
Fits	-	2(100)	2(100)
Pulmonary	-	-	-
Asthma	-	-	-
Cough	8(50)	8(50)	16(100)
Difficult breathing	-	-	-

Table 5 shows the results of a survey to determine whether similar effects exist in the Mansa and Petauke districts, and Table 6 shows what symptoms occurred after painting the house.

Table 5. Adverse Effects Experienced since Last Survey

Ill Since Last Survey	Intervention, n (%)	Control, n (%)	Total
-----------------------	---------------------	----------------	-------

No	90(93.7)	80 (91)	170 (92.4)
Yes	6 (6.3)	8 (9)	14 (7.6)
Total	96(100.00)	88 (100.00)	184 (100.00)

Table 6. Adverse Effects since Painting, Month 12

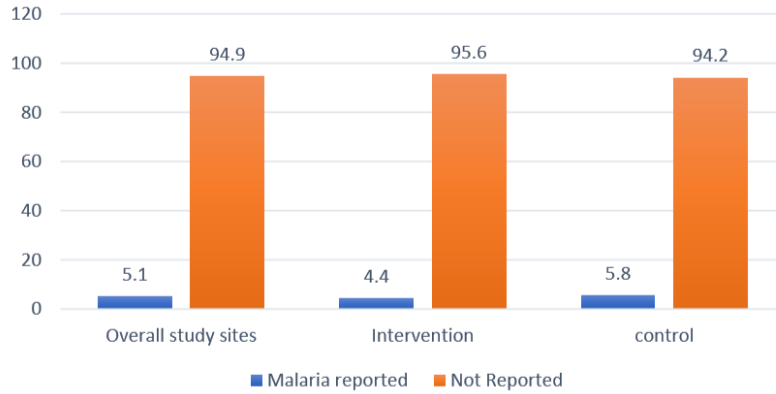
Symptoms	Intervention	Control	Total
Allergic/Immunological			
Rash	0	1(100)	1(100)
Sneezing	3(60)	2(40)	5(100)
Redness of Skin	-	-	-
Cardiac			
Palpitation	-	-	-
Swelling of limbs	-	-	-
Hypotension	-	-	-
Hypertension	-	-	-
General			
Fatigue	3(42.9)	4(57.1)	7(100)
Fever	4(50)	4(50)	8(100)
Headache	4(44.4)	5(55.6)	9(100)
Insomnia	1(100)	-	1(100)
Chills	2(100)	-	2(100)
Sweating	2(50)	2(50)	4(100)
Dermatologic			
Dry skin	1(100)	-	1(100)
Itchy skin	-	-	-
Ear/Nose/Throat			
Voice change	-	-	-
Hearing loss	-	-	-
Eyes/Ophthalmologic			
Redness of eyes	-	-	-
Tearing	-	-	-
Blurring of vision	-	-	-
Gastrointestinal			

Poor appetite	-	-	-
Constipation	1(50)	1(50)	2(100)
Heart burn	-	1(100)	1(100)
Nausea	-	-	-
Musculoskeletal			
Leg crAMPs	-	1(100)	1(100)
Leg pain	-	-	-
Neuropsychiatric			
Mood alternation	-	-	-
Dizziness	-	-	-
Fits	-	1(100)	1(100)
Pulmonary	-	-	-
Asthma	-	-	-
Cough	2(33.3)	4(66.6)	6(100)
Difficult breathing	-	-	-

93.7% of AMP-applied houses and 91% of control houses replied that they had no illness since the last survey. Table 6 shows the symptoms of 14 people who reported that there was some effect after painting. All respondents who answered "YES" to the symptoms in Table 6 received drug treatment for the symptoms.

② -2: Malaria cases

Malaria cases were estimated based on reported diagnoses and drugs administered to patients reported by the head of household. The figure below shows a comparison of malaria cases by self-report in AMP-applied and control houses. The results show that 5.1% of households reported malaria cases, 4.4% in AMP-applied houses and 5.8% in control houses. There was no statistical difference between the two cases.



(Figure) Comparison of malaria cases in AMP-applied and control houses

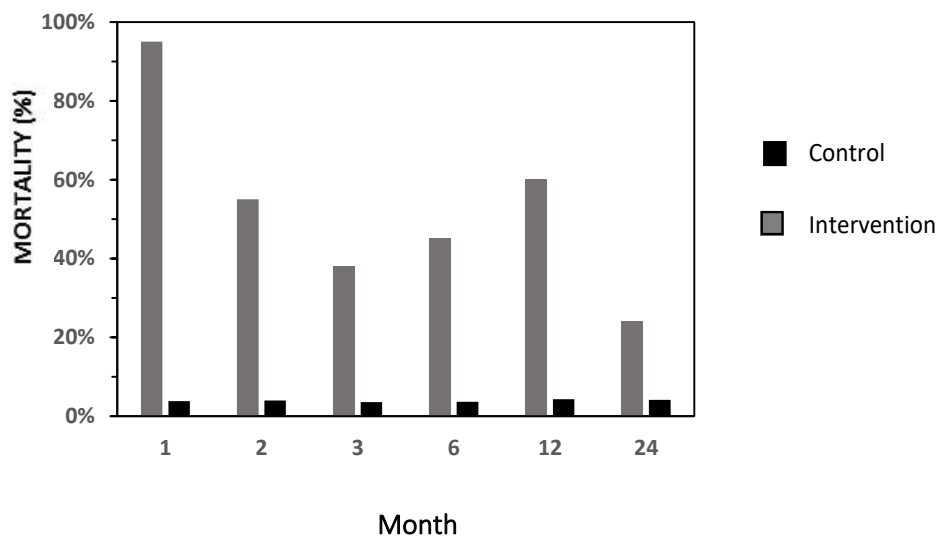
Malaria			
	Reported	Not Reported	Total
Intervention	8(42.1%)	173(49.3%)	181(48.9%)
Control	11(57.9%)	178(50.7%)	189(51.1%)
Total	19(100%)	351(100%)	370(100%)

③ Entomological evaluation results

Anopheles were not captured indoors in all five districts, so all analyzes were performed in Culex. Insufficient samples have not been captured for pesticide resistance monitoring, and no meaningful discussion can be made at this time. It will continue under the National malaria Elimination program.

③ -1 : Siavonga

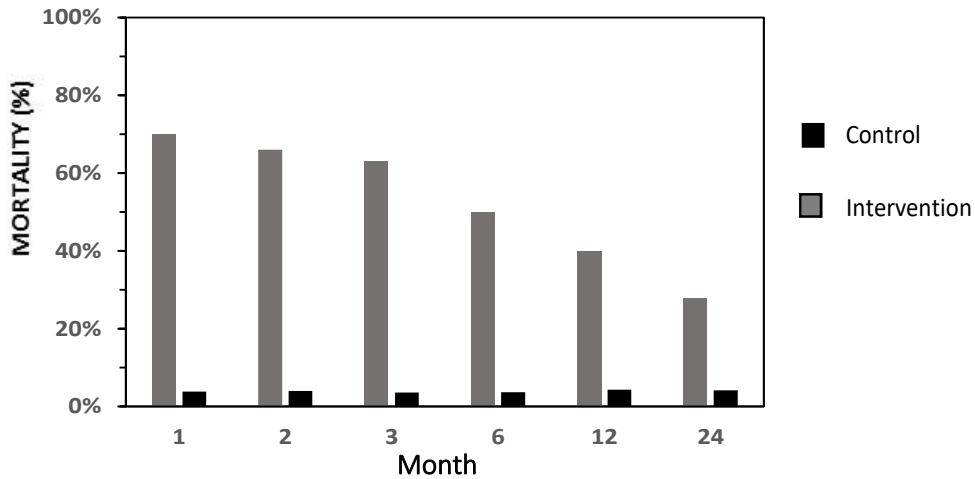
In the Siavonga area, no mosquitoes were caught indoors, so it is not possible to compare indoor mosquito densities in AMP-applied and control houses, but the mortality rate from the corn test was 95% in one month and 75% in two months, 55% at 3 months, 38% at 6 months, 60% at 12 months and 24% at 24 months.



(Figure 1) The residual effect of AMP on Siavonga

③ -2: Mkushi

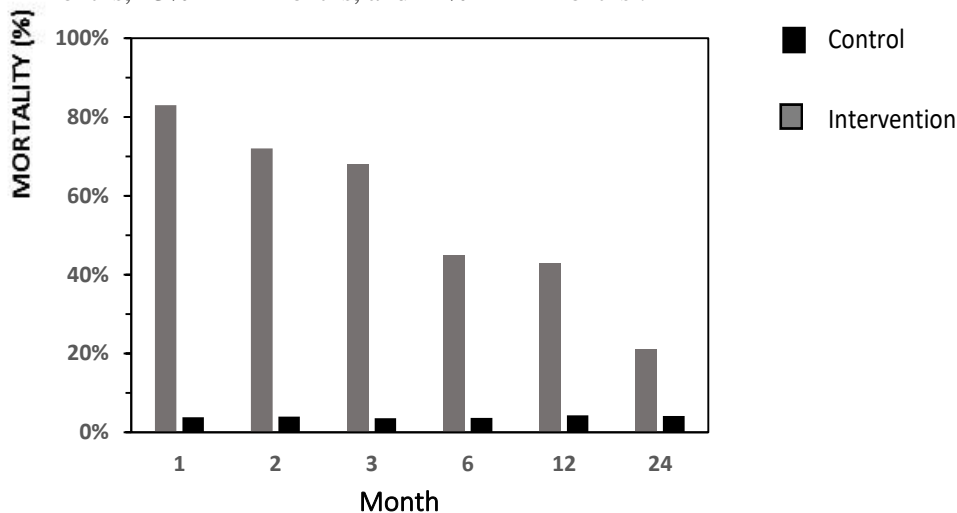
In the Mkushi area, a total of 223 mosquitoes were caught indoors, and there was a significant difference between AMP-coated and control houses. The residual effect of AMP was 83% at 1 month, 72% at 2 months, 68% at 3 months, 45% at 6 months, 43% at 12 months and 28% at 24 months.



(Figure 2) Residual effect of AMP on Mkushi

3 : Kapiri • Mposhi

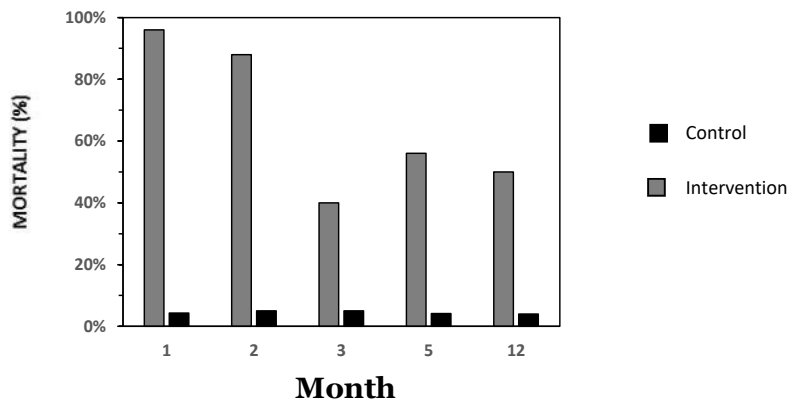
In the Kapiri-Mposhi area, 371 mosquitoes were captured indoors, and a similar pattern was observed here, with a significant difference between the AMP-coated house and the control house. The residual effect of AMP was 83% in 1 month, 72% in 2 months, 68% in 3 months, 45% in 6 months, 43% in 12 months, and 21% in 24 months.



(Figure 3) Residual effect of AMP on Kapiri / Mposhi

③-4 : Mansa

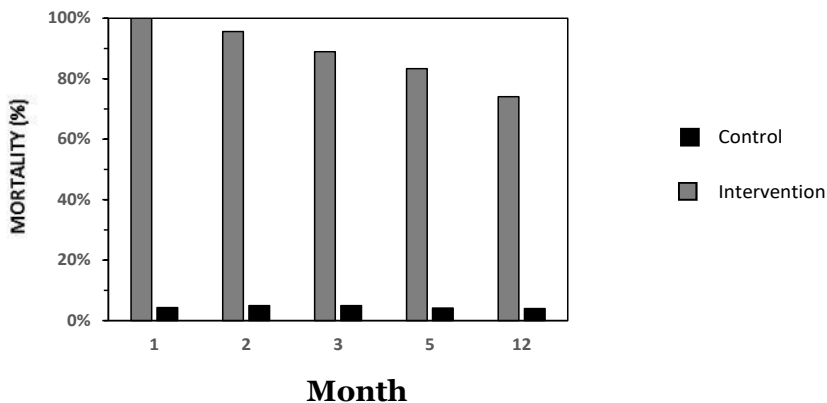
288 Culex were captured in both the AMP-coated and control houses, with a residual effect of AMP of 96% at 1 month, 88% at 2 months, 40% at 3 months, 56% at 5 months and 56%. It was 50% at 12 months, and there was a significant difference between the two areas, although mosquitoes were captured indoors.



(Figure 4) Residual effects of AMP on Mansa

⑤ -5 : Petauke

434 Culex were captured in both the AMP-coated and control houses. Mortality in this area was exceptionally high throughout the evaluation period. The residual effect of AMP was 100% at 1 month, 95% at 2 months, 84% at 3 months, 83% at 5 months and 74% at 12 months. A significant difference was observed between the two areas.



(Figure 5) Residual effect of AMP on Petauke

④ Conclusion and future

○ Safety evaluation

- No significant adverse effects were observed in the safety evaluation. The reason is that there is no difference in the symptoms reported between the AMP application area and the control area, and the symptoms associated with AMP cannot be related to other environmental or biological factors.

○ Entomological evaluation

The following was found from entomological evaluation (Bioassay) by NMEC.

- It should be noted that the Anopheles could not be captured in both the AMP area and the control area. This may be due to paint repellency and irritation.

- The sustainability of AMP was less than the 80% mortality rate specified by WHO in 6 months in all 4 districts except Petauke district. Petauke is about 80% in 12 months.
- However, in all five AMP-applied areas, the indoor stay density of Culex was reduced and Anopheles was not caught.
- Although there was a difference in the absolute value of the entomological evaluation between the AMP application area and the control area, there was no statistical difference in malaria cases between them.
- In Kansai Plascon, it is necessary to search for paint formulations using next-generation insecticides to reduce resistant mosquitoes. Other alternatives include the use of PBOs with pyrethroids as a way to enhance the action and effectiveness of enzymes based on resistance mechanisms for widespread spread in Zambia.
- And it may be necessary to adjust the reinforced resin for more sustainability.

5.1. Achievements of this project (contribution to target countries / regions / cities)

Through this project, the effects, usefulness and safety of AMP were recognized by MOH, MOH-related organizations, government agencies in each region, paint contractors, survey subjects in each region, etc., and they were approved AMP as antimalarial paints.

As a major achievement, with the results of a six-month survey (not waiting for the two years survey results) , MOH judged the effectiveness and safety of AMP and decided to approve AMP as antimalarial paints. This is groundbreaking that MOH made an effort to save people from malaria by going the product on the market as soon as possible.

5.2. Results of this project (business side), remaining issues and their solution policy

5.2.1. Results of this project (business side)

Earlier approval from the MOH was a huge success for the business. The project started in November 2017, and one year later, on October 1st 2018, the launch ceremony of AMP was held

More than 150 members attended the ceremony, including Vincent Mwale, the Minister of Local Affairs, Kennedy Malama, Deputy Secretary of Health, Secretary-General Hidenori Sidejima, Ambassador of Japan to Zambia, Junichi Hanai, Director of JICA Zambia Office, and Hiroshi Ishino, President of KPJ.

At the ceremony, the presentation of AMP (tape cutting) and the demonstration of AMP by speech practitioners were performed. The Minister of Local Affairs Mwale stated, “Expectations of mosquito repellent paints improving the lives of people suffering from malaria,” and Mr. Hanai from the Ministry of Health and related organizations. “Request for further cooperation to promote sales” and Ishino commented, “This year, when our company celebrated its 100th anniversary, we are pleased that we have achieved our major goal of starting sales of mosquito paint in Zambia. Not only in Zambia, but also we will contribute to the eradication of malaria in Africa and the world, and thanks to JICA and the Zambian government.”

Photo: AMP launch ceremony





5.2.2. Issues and solution policy

At present, it is not limited to B-to-B (and B-to-G) business but has also started business to B-to-C (to MARKET). We want to increase the reputation in the market by distributing products, and to convey the appeal of AMP through CSR, exhibitions, sales opportunities, etc.

Photo: Sales promotion and advertising at dealers



Photo : WORLD MALARIA DAY AND NATIONAL HEALTH WEEK



Photo: CSR activities (free painting for elementary schools and hospitals)



In this way, through AMP's sales activities and social contributions, the company's awareness and business results are increased, the company's business is sustained, and continuous support is provided for employment and economic contribution to society and the government. I think that doing so is a future task.

PROFESSIONAL ANTI MOSQUITO PAINT

PRODUCT CODE: PAM 1 & TAM 1000 Tint base

TECHNICAL DATA SHEET

Product Description	Professional Anti Mosquito paint is a coating with insecticide for interior use.														
Intended Uses	<ul style="list-style-type: none"> For use on hard, non-porous interior ceilings, walls, doors, and trim in residential commercial, educational, institutional rooms and in non-critical areas of hospitals. Suitable for nursing homes, assisted living facilities and other classes of group homes, day care centres, doctor and dentist offices, non-critical areas of hospitals such as waiting rooms, examination rooms, hallways and walkways. Also for use in commercial facilities, schools, universities, colleges, dorm rooms and health clinics. 														
Features & Benefits	<ul style="list-style-type: none"> Smooth matt finish Easy to apply without spattering Available in various shades Washable Excellent opacity and covering capacity Low VOC (VOC: < 40 gm / L) No added APEO (Alkyl phenol Ethoxylates compounds) Ammonia free No added Lead and Heavy metals It is effective against mosquitoes like: <i>Aedes aegypti</i>, <i>Culex quinquefasciatus</i>, <i>Anopheles stephensi</i>. 														
Product Information	Appearance	Matt													
	Colour	White (PAM 1)													
	Tint Bases	Pastel Tint Base (TAM 1000),													
	Generic Type	Acrylic emulsion													
	Volume Solids	41.55%													
	Viscosity at 23 °C	95 – 100 KU													
	Recommended DFT	20 – 30 µm													
	Recommended WFT	91 – 136 µm													
	Theoretical spreading rate	7 m ² /L at 21 µm DFT													
	Practical spreading rate	Practical spreading rate will vary depending on profile of the substrate as well as the application technique and tools used.													
	VOC	<40 g/L for White													
Application Details	Mixing	Stir thoroughly with a flat paddle until homogeneous.													
	Method	Brush, roller or airless spray.													
	Thinning	Ready for use													
	Cleaning	Water													
	Drying time	Touch dry: 1 h @ 23 °C Over coating: 4 h @ 23 °C													
	Application Environment	<table border="1"> <thead> <tr> <th>Surface Temperature</th> <th>Ambient Temperature</th> <th>Relative Humidity</th> </tr> </thead> <tbody> <tr> <td>Min: 10 °C</td> <td>Min: 10 °C</td> <td>Min: 10%</td> </tr> <tr> <td colspan="3">or 3 °C min. above dew point</td> </tr> <tr> <td>Max: 35 °C</td> <td>Max: 35 °C</td> <td>Max: 85%</td> </tr> </tbody> </table>		Surface Temperature	Ambient Temperature	Relative Humidity	Min: 10 °C	Min: 10 °C	Min: 10%	or 3 °C min. above dew point			Max: 35 °C	Max: 35 °C	Max: 85%
Surface Temperature	Ambient Temperature	Relative Humidity													
Min: 10 °C	Min: 10 °C	Min: 10%													
or 3 °C min. above dew point															
Max: 35 °C	Max: 35 °C	Max: 85%													
Storage and Packaging	Store away from direct sun, heat and severe cold. Packaging: 5 L and 2.0L														

PROFESSIONAL ANTI MOSQUITO PAINT

PRODUCT CODE: PAM 1 & TAM 1000 Tint base

Tint Bases	<ul style="list-style-type: none"> The tint base containers are underfilled to levels which are specific for each tint base to allow for a calculated volume of colourants to be added. The volume indicated on the container is only achieved after the addition of all prescribed colourants as per the formulation. The tint bases and the colourants are unfinished or intermediate products which are not recommended for use by themselves. A finished product is only produced once the prescribed quantities of colourants have been intimately mixed with the tint base. When mixed to a finished product its technical features, product information, application and surface preparation details comply with that of PROFESSIONAL ANTI MOSQUITO PAINT. Only colourants from the Plascon Inspired colour system are permitted for use when tinting.
Tinting Procedure	<ul style="list-style-type: none"> Select the required colour and reference no. from the INSPIRED COLOUR fandeck, other suitable fandecks or colour cards and locate the applicable formulation from the tables. Certain colour choices may require more than two coats to achieve full obliteration (see computer formulations for details in remarks column prior to tinting) Select the required tint base and volume for tinting and set the tinting machine to deliver the correct amount of colourants as per formulation. Inject all required colourants, close container and shake on mechanical shaker for 5 minutes. Note: UNDER NO CIRCUMSTANCES MUST COLOURS BE TINTED FROM PROFESSIONAL ANTI MOSQUITO PAINT - USE ONLY THE PRESCRIBED TINT BASES
Surface Preparation	<p>Ensure that surfaces are dry, sound, and free from dust, dirt, grease and oil before painting.</p> <ol style="list-style-type: none"> NEW WORK <ol style="list-style-type: none"> Cement plaster, concrete and porous brickwork: Ensure concrete has dried for 4 weeks and cement plaster for 2 weeks. Apply one coat of PROFESSIONAL GYPSUM AND PLASTER PRIMER (PP 700). Gypsum plaster (e.g. Rhinolite, Crestone), brickwork stone work: Apply one coat of PROFESSIONAL GYPSUM AND PLASTER PRIMER (PP 700). If a gypsum plaster has been used as the joint skimming filler on gypsum board or dry wall partitioning, then seal these areas with PROFESSIONAL GYPSUM AND PLASTER PRIMER (PP 700). Fibre cement board: prime with BONDING LIQUID (CV1 14) Wood: Sand to a smooth finish and dust off. Seal knots and resinous areas with KNOT SEAL (PK 2) Prime with PLASCON WOOD PRIMER (UC 2) Mild Steel: Degrease with AQUASOLV DEGREASER (GR 1). Rinse thoroughly with water. Remove any rust by coarse sanding, mechanical grinding etc. Prime general surfaces the same day with METALCARE MILD STEEL PRIMER (UC 501) or PLASCOSAFE 18 PRIMER (EMS 18) followed by PROFESSIONAL ALL PURPOSE UNDERCOAT (PU 800) Galvanised steel: Clean with GALVANISED IRON CLEANER (GIC 1) to achieve a water break-free surface. Rinse thoroughly with water. Prime the same day with PLASCON GALVANISED IRON PRIMER (GIP 1) PREVIOUSLY PAINTED SURFACES <ol style="list-style-type: none"> Previously painted surfaces in good condition: Remove loose and flaking paint back to a sound substrate and a firm edge by scraping and sanding. Clean down with POLYCELL SUGAR SOAP POWDER CLEANER solution to remove all contaminants and chalked material. Rinse with clean water to remove all traces of sugar soap. Alternatively, clean with high pressure water jet. Spot prime bare areas with appropriate primer. Sand glossy enamel surfaces to a matt finish and apply one coat of PROFESSIONAL ALL PURPOSE UNDERCOAT (PU 800). Previously painted surfaces in poor condition: Completely remove paint by most appropriate means e.g. scraping, coarse sanding or stripping with REMOVAL ALL PURPOSE COATINGS REMOVER (RRA 220). Wash thoroughly with POLYCELL SUGAR SOAP. Rinse well with fresh water to remove all traces of the cleaning agents and debris. Ensure substrate is sound, not powdery or friable, prior to coating. Proceed as for NEW WORK FILLING Fill all imperfections with POLYCELL MENDALL 90 and spot prime filled areas with PROFESSIONAL GYPSUM AND PLASTER PRIMER (PP 700).
Application	<ul style="list-style-type: none"> Apply when air and surface temperature are between 10 to 31°C. Stir paint occasionally. Use a high quality 3/8 – 1/2 inch nap roller cover, nylon / polyester brush. Apply two or three coats to a new surface complete obliteration. Darker colours may require an additional coat. For highly porous surfaces, apply PROFESSIONAL GYPSUM AND PLASTER PRIMER (PP 700).

PROFESSIONAL ANTI MOSQUITO PAINT

PRODUCT CODE: PAM 1 & TAM 1000 Tint base

Caution

- The product contains Permethrin.
- Metal surfaces must be primed, do not apply to bare metal.
- Do not use on floors or on exterior surfaces. **FOR INTERIOR USE ONLY.**

Safety precautions

- Keep out of reach of children.
 - Apply only with adequate ventilation. To avoid overexposure, open windows and doors or use other means to ensure that fresh air enters during application and drying. If you experience eye watering, headaches or dizziness, increase ventilation or wear respiratory protection (SABS approved) or leave the area.
 - In case of skin contact, wash with soap and water or a recognised skin cleaner.
 - Avoid contact with eyes – In case of contact, rinse eyes immediately with plenty of water and seek medical advice if symptoms persist.
 - Harmful if swallowed. Do not induce vomiting. Seek medical attention.
 - Refer to Safety Data Sheet for complete information.
-

DISCLAIMER:

The recommendations contained herein are given in good faith and are meant to guide the specifier or the user. They are based on results gained from our tests and experiences and are believed to be reliable. No guarantee is implied by the recommendations contained herein since conditions of use, method of application and cleanliness of the substrate prior to painting are beyond our control.

NB: Technology may change with time necessitating changes to this Technical Data Sheet (TDS). It is the responsibility of the user to ensure that the latest TDS is being used.

NB: TO ORDER: Quote product name, product code number, packaging and colour.

KANSAI PLASCON (PTY) LIMITED

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PLASCON ADVISORY SERVICE: 0860 20 40 60

EMAIL: advice@kansaiplascon.co.za

Professional Anti Mosquito Paint White (PAM 1)

Section 1. Identification

GHS product identifier : Professional Anti Mosquito Paint White (PAM 1)

Other means of identification : Not available

Relevant identified uses of the substance or mixture and uses advised against

Identified uses : No data available

Supplier's details : Kansai Plascon (Pty) Ltd
P.O. Box 4010
Luipaardsvlei
1743

Emergency phone : (011) 951 4500 (within hours of operation)


Facsimile : (011) 955 2841

National Contact Person : Mr C. Costa

Section 2. Hazards identification

Classification of the substance or mixture : SKIN SENSITIZATION - Category 1
ACUTE TOXICITY (ORAL) - Category 4
ACUTE TOXICITY (DERMAL) - Category 4
ACUTE TOXICITY (INHALATION) - Category 4
AQUATIC TOXICITY (ACUTE) - Category 1
AQUATIC TOXICITY (CHRONIC) - Category 1

Label elements according to : SANS 10234: 2008

Hazard pictograms : 

Signal word : Warning

Hazard statements : H302 - Harmful if swallowed.
H312 - Harmful if in contact with skin.
H317 - May cause an allergic skin reaction.
H332 - Harmful if inhaled.
H400 - Very toxic to aquatic life
H410 - Very toxic to aquatic life with long-lasting effects.

Precautionary statements

General : P101 - If medical advice is needed, have product container or label at hand.
P102 - Keep out of reach of children.
P103 - Read label before use.

Prevention : P280 - Wear protective gloves.
P273 - Avoid release to the environment.



Professional Anti Mosquito Paint White (PAM 1)

P261 - Avoid breathing vapor.

P264 - Wash hands thoroughly after handling.

P272 - Contaminated work clothing should not be allowed out of the workplace.

Response : P314 - Get medical advice or attention if you feel unwell.
 P391 - Collect spillage.
 P301+330+331 - IF SWALLOWED- Rinse mouth. Do NOT induce vomiting.
 P302+352 - IF ON SKIN: Wash with plenty of soap and water.
 P362 - Take off contaminated clothing. Wash contaminated clothing before reuse.
 P333+313 - If skin irritation or rash occurs: Get medical attention.

Storage : P410- Protect from sunlight.
 P404- Store in a closed container.
 P403+235- Store in a well ventilated place. Keep cool.

Disposal : P501 - Dispose of contents/containers in accordance with local regulation.

Other hazards which do not result in classification : None identified

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Other means of identification : Not available

CAS number/other identifiers

CAS number : Not applicable

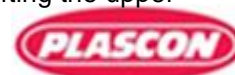
Ingredient name	CAS number	%	SANS 10234 Classification
Permethrin	52645-53-1	<1.0	Acute Tox. 4, H302 Acute Tox. 4, H312 Acute Tox. 4, H332 Skin Sens. 1, H317 Aquatic Acute 1, H400 Aquatic Chronic 1, H410

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section. Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper



Professional Anti Mosquito Paint White (PAM 1)

and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation persist.

- Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.
- Skin contact : Remove contaminated clothing and shoes. Wash contaminated skin with soap or a recognised skin cleaner and plenty of water. Avoid the use of solvents. Get medical attention if symptoms persist. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Wash out mouth with water. Remove dentures if any. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe.

Most important symptoms/ effects, acute and delayed

Potential acute health effects

- Eye contact : No known significant effects or critical hazards.
- Inhalation : No known significant effects or critical hazards.
- Skin contact : Causes skin irritation. May cause an allergic skin reaction.
- Ingestion : Harmful if swallowed.

Over-exposure signs/symptoms

- Eye contact : Adverse symptoms may include pain or irritation, watering or redness.
- Inhalation : Adverse symptoms may include nausea or vomiting, headache, respiratory irritation, drowsiness/fatigue or dizziness/vertigo.
- Skin contact : Adverse symptoms may include irritation or redness.
- Ingestion : No data available.

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments : No specific treatment.
- Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training.

See toxicological information (Section 11)



Professional Anti Mosquito Paint White (PAM 1)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire such as foam, CO2 or dry powder.

Unsuitable extinguishing media : None known.

Specific hazards arising from from the chemical

: In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products

: Decomposition products may include the following materials
carbon dioxide
carbon monoxide
metal oxide/ oxides.

Special protective actions For fire-fighters

: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters

: Fire-fighters should wear appropriate protective equipment and self contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

: No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Put on appropriate personal protective equipment.

For emergency responders

: If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions

: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill

: Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with



Professional Anti Mosquito Paint White (PAM 1)

an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill

: Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

: Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist.

Conditions for safe storage, including any incompatibilities

: Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. Do not reuse container.

Section 8. Exposure controls/personal protection

Occupational exposure limits : None.

Recommended monitoring Procedures

: If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Appropriate engineering controls

: No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.



Professional Anti Mosquito Paint White (PAM 1)

Environmental exposure controls

: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures

: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

: Avoid direct contact. Never touch eyes with dirty hands or gloves. Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts.

Hand protection

: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Body protection

: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection

: Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection

: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary e.g. in case of insufficient ventilation. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Physical state	: Viscous Liquid
Colour	: White
Odor	: No data available.
Odor threshold	: No data available.
pH	: 8.0 – 9.0



Professional Anti Mosquito Paint White (PAM 1)

Melting point	: No data available.
Boiling point	: No data available.
Flash point	: Product does not sustain combustion.
Evaporation rate	: No data available.
Flammability (solid, gas)	: Not applicable.
Lower and upper explosive (flammable) limits	: Not applicable.
Vapor pressure	: No data available.
Vapor density	: No data available.
Relative density	: 1.4 (typical)
Solubility	: Water miscible
Partition coefficient, n-octanol/water	: No data available.
Auto-ignition temperature	: No data available.
Decomposition temperature	: No data available.
Viscosity	: 90-98 KU

Section 10. Stability and reactivity

Reactivity	: Inert - no reaction with fire-fighting water
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	: No data available.
Incompatible materials	: No data available.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.



Professional Anti Mosquito Paint White (PAM 1)

Section 11. Toxicological information

Acute Toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Permethrin	LD50 Dermal	Rat	2000 mg/kg	-
	LD50 Oral	Rat	300 mg/kg	-
	LC50 Inhalation	Rat	0.32 mg/l of air	4 hours

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Permethrin	Eye - Mild irritant	Rabbit	-	-	-
	Skin - Non irritant	Rabbit	-	-	-

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target Organs
None			

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target Organs
None			

Aspiration hazard

Name	Result
None	

Information on the likely routes of exposure : Ingestion

Potential acute health effects

Eye contact : No known significant effects or critical hazards.
 Inhalation : No known significant effects or critical hazards.
 Skin contact : Causes skin irritation. May cause an allergic skin reaction.
 Ingestion : Harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include pain or irritation, watering or redness.
 Inhalation : Adverse symptoms may include nausea or vomiting, headache, respiratory irritation, drowsiness/fatigue or dizziness/vertigo.
 Skin contact : Adverse symptoms may include irritation or redness.
 Ingestion : No data available.

Potential Chronic health effects

General : Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.
 Carcinogenicity : No known significant effects or critical hazards.
 Mutagenicity : No known significant effects or critical hazards.
 Teratogenicity : No known significant effects or critical hazards.
 Developmental effects : No known significant effects or critical hazards.
 Fertility effects : No known significant effects or critical hazards.



Professional Anti Mosquito Paint White (PAM 1)

Acute toxicity estimates

No data available.

Section 12. Ecological information

Toxicity

Product/Ingredient name	Result	Species	Exposure
Permethrin	Acute LC 50 0.019 mg/l	Fish	96 hours
	Acute EC50 0.00064 mg/L	Daphnia	48 hours

Persistence and degradability

Product/Ingredient name	Aquatic half-life	Photolysis	Biodegradability
None			

Bioaccumulative potential

Product/Ingredient name	LogPow	BCF	Potential
Permethrin	6.5	-	High

Mobility in soil

Soil/ water partition coefficient (K_{oc})

: No data available.

Mobility

: No data available.

PBT/vPvB data

: P: No data available. B: No data available. T: No data available.

Other adverse effects

: No known significant effects or critical hazards.

Section 13. Disposal considerations




Disposal methods

: The generation of waste should be avoided or minimized wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.



Professional Anti Mosquito Paint White (PAM 1)

Section 14. Transport information

	Transportation - road - SANS 10228:2012	Transportation- Maritime - IMO/ IMDG	Transportation- Air - IATA
UN number	UN3082	Not regulated.	Not regulated.
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (permethrin)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (permethrin)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (permethrin)
Transport hazard class(es)	9 	9 	9 
Packing group	III	III	III
Marine pollutant	Yes	Yes	Yes
Additional information	No data available	Emergency schedules (EmS): F-A, S-F	Passenger and Cargo Aircraft Ltd QTY: Quantity limitation: 30 kg G Packaging instructions: Y964 Passenger and Cargo Aircraft: Quantity limitation: 450 L Packaging instructions: 964 Cargo Aircraft Only: Quantity limitation: 450 L Packaging instructions: 964
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC code	No data available	No data available	No data available

Section 15. Regulatory information

Safety, health and environmental regulations specific for the product

: Relevant information regarding authorization: Occupational Health and Safety Act 1993 Regulation for Hazardous Chemical Substances.

Relevant information regarding restrictions: None known.

EU regulations: Regulation EC 1272/2008 [EU-GHS/CLP] and EU directives 67/548/EEC or EC 1999/45/EC

Other National regulations: None. Standards used for PPE recommendations in Section 8: NIOSH-National Institute for Occupational Health and Safety (USA) EN 166- European standard which concerns the area of eye protection. EN 374-3 European standards for permeation and penetration. EN 141/EN 143 European standards for gas mixtures to remove specified gases and vapours or



Professional Anti Mosquito Paint White (PAM 1)

combined filters for removing solids, and/or liquid particles and specified gases and vapours.

Section 16. Other information

History

Date of printing : 31/01/2018

Date of previous issue : Not applicable

Key to abbreviations

: ATE = Acute Toxicity Estimate

BCP Bioconcentration Factor

GHS = Globally Harmonized System of Classification and Labelling of Chemicals

IATA = International Air Transport Association

IBC = Intermediate Bulk Container

IMDG = International Maritime Dangerous Goods

LogP_{ow} = logarithm of the octanol/water partition coefficient

MARPOL 73/78 = International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)

RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail

UN = United Nations

References

: Supplier safety data sheets

Further information:

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.

Notice to readers:

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November 2019

Safety Assessment Report:

Month 24- Kapiri Mposhi, Mkushi, &
Siavonga Districts

Month 12- Petauke & Mansa Districts

Entomological Report:

Month 24-Kapiri Mposhi, Mkushi, &
Siavonga Districts

Month 12-Petauke & Mansa

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<u>Results</u>	エラー! ブックマークが定義されていません。
<u>Siavonga</u>	エラー! ブックマークが定義されていません。
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Section 1. Introduction

Background

Worldwide over 3.3 billion people are at risk of malaria in 97 countries, 216 million cases were confirmed in 2016 and 445 000 deaths recorded. The majority of these deaths occurred in sub-Saharan Africa. In Zambia, malaria is endemic throughout the country and the main vectors incriminated in its transmission include *Anopheles gambiae sensu stricto*, *Anopheles arabiensis* and *Anopheles funestus* mosquitoes [1, 2]. Malaria in Zambia is transmitted all year round, but the peak transmission times are in the rainy season during the months of April up to May. The predominant malaria parasite is *Plasmodium falciparum* (98% of cases) with the remainder (2%) shared between *Plasmodium ovale* and *Plasmodium malariae*. The current national incidence rate is 336 per 1000 people per year [3].

The main vector control interventions for preventing malaria transmission include the use indoor residual spraying (IRS), long lasting insecticide treated nets (LLINs) and larval source management as a supplementary strategy [3-6]. However, these interventions are comprised by insecticide resistance which has been reported in 49 countries and 39 of which have reported resistance to pyrethroids. This worsened by the fact that there are only four classes of insecticides (organo-phosphates, carbamates, pyrethroids and organo-chlorines) and only pyrethroids can be applied on insecticide treated nets. The resistance management strategy currently relies on the available insecticides which have to be applied in form of rotations, mixtures and combinations until new insecticide formulations are made available [7].

In line with the Global Technical Strategy for malaria elimination 2016-2030, encourages harnessing of new innovations and implementation of integrated vector control (IVM) [8]. As such the National Malaria Elimination Programme has re-aligned its policy from control to elimination by 2021. In order to achieve this ambitious goal there is urgent need to have a broad spectrum of complimentary interventions such as the anti-mosquito paint which can be obtained at a point of sale and locally produced by Kansai-Plascon Zambia.

The Kansai anti-mosquito paint containing permethrin was developed in Japan and is a knockdown (KD) surface application paint used on interior surfaces. Laboratory data suggests that product retains a high efficacy for close to 24 months after application, and is toxicologically safe around humans. Further laboratory pre-tests were conducted at the National Malaria Elimination Centre

entomology laboratory in Lusaka so as to demonstrate its efficacy in terms of mortality on susceptible reared Kisumu mosquito strain and the results were encouraging.

Additionally, Kansai Paint's Anti-Mosquito Paint will assist to support the health management system by providing an innovative vector control method. This project aims to add to the vector control methods in Zambia, by providing a method that can be used on broad enclosed spaces, affordable, readily available, and safe--including during pregnancy. Permethrin, the active ingredient found in the AMP, is already being used in tropical areas to prevent mosquito-borne diseases, including malaria. Permethrin is listed on the WHO List of Essential Medicines as an effective and safe medicine needed in a health system (World Health Organization, 2016).

Although the 2015 Malaria Indicator Survey reflected the benefits of the mass distribution of ITNs in 2014, it noted there was not enough ITNs available to ensure full coverage of all sleeping spaces (Malaria Indicator Survey, 2016). Additionally, the cost of ITNs serves as a barrier for the population, especially in rural areas. In contrast, the cost per square meter per annum of AMP is considerably lower for the efficacy provided. This study will help achieve broad space vector controls with high cost efficiency. Based on proven efficacy, advocacy of this product will be recommended for policy and deployment as an alternative vector control tool in Zambia. Results of this study will contribute to the body of knowledge and potentially address challenges faced with in-door residual spraying.

Objectives

The objectives of this study are:

1. To evaluate the residual efficacy of Kansai Anti Mosquito Paint 'Knock Down Ability' during the 24-month period through periodic entomological assessments
2. To assess adverse events that may be associated with the utilization of the Kansai Anti Mosquito Paint
3. To determine differences in malaria incidence and symptoms between study arms within the 24-month period

Section II. Methodology

Safety Assessment Visits

The research team will be making 5 safety assessments during the study. These assessments will be conducted at 0 months, 3 months, 6 months, 12 months, and 24 months. The safety assessments are expected to take 3-5 days and will be used to determine if any adverse effects are being experienced by household members participating in the study. All adverse effects will be reported to the nearest health facility and to the District Medical Officer.

Entomological Assessment Visits

The entomological assessments were conducted during the same time periods as the safety assessments. The overall aim of the entomological monitoring was to determine the residual efficacy of the Kansai Anti Mosquito paint. For the purposes of this preliminary report, the results are based on three districts namely Siavonga in Southern province, Kapiri-Mposhi and Mkushi in Central province.

The main vector previously incriminated for transmitting malaria in Mkushi and Kapiri-mposhi are mosquitoes from the *anopheles gambiae complex* while in Siavonga it is perpetuated by *An.arabiensis* and *An.funestus*. The methodologies were standardised across all sites in the three districts. The Centre for Disease Control & Prevention (CDC) light traps were used to capture indoor mosquitoes in both the control and intervention areas. These traps were placed in 15 randomly selected households every month and collected and stored by community health workers (CHWs) who have been trained in mosquito entomology. This was followed by selecting 3 randomly selected households in the intervention area and one in the control area for con bio-assays at month 1, 2, 3 and 6. The con bio-assays were conducted to monitor the long lasting efficacy of AMP over time using the susceptible Kisumu strain from the entomology laboratory at the National Malaria Elimination Centre. Additionally, CHWs were deployed to collect mosquito larvae from various breeding habitats for insecticide resistance testing.

Field Activities

Safety Assessment

Data collection comprised of trained enumerators, entomologists, and research team. Enumerators returned to designated study sites and administered the follow up survey using a PDA. As customary, before conducting the surveys, the enumerator informed the respondent of the intent

of the survey, the confidentiality of the survey, and the right of the respondent to stop at any time or refuse to answer. Written consent was acquired from the survey respondent before the enumerator proceeded with the questionnaire. Enumerator provided instructions and conducted the survey in the local language. If no one was at the house at the time of visit, the enumerator returned later to the same household to conduct the survey. Once written consent was received, the household kept one copy and the enumerator kept another copy for the study records. Safety assessment data were analyzed using STATA Version 14. Univariate analyses was utilized and certain variables were disaggregated by control vs. intervention to identify any major differences between study arms.

Entomological Assessment

Every morning at 7am, mosquitoes were collected from the CDC light traps. The mosquitoes were then separated at genus level by the trained CHWs. The collected mosquitoes were then transported to the National Malaria Elimination Centre and identified morphologically, using identification keys and sorted by entomology laboratory technicians. The females will further be classified into their blood feeding stages either unfed, fed or gravid. For con bio-assays mosquitoes were kept in cups with sugar and observed for 24hrs in a humidified, ventilated, shaded field insectary to observe rates of delayed mortality. The mosquitoes were desiccated over anhydrous calcium sulphate and stored at room temperature. The data was then initially entered on standardized paper forms with well-established data dictionaries and linkage structure and then entered onto standardized CSV templates which exactly match the structure of the CSV form. These filled templates were then uploaded to the secure server which we extracted the data and append it to the database in a consistent format.

Data were analysed using R statistical analysis version 3.2.1 augmented with lattice, matrix and lme4 packages. The effect of treatment (fixed factor) and time upon those treatments (continuous scalar) upon the all relevant outcomes were estimated using generalized linear mixed models (GLMM), with date and household treated as random effects. While counts (mosquitoes entering houses) were treated as Poisson-distributed dependent variables.

Section III. Results- Month 24 (Kapiri Mposhi, Mkushi, & Siavonga districts)

Demographics

A total of 173 respondents were interviewed during Safety Assessment Month 24: 57 respondents in Kapiri Mposhi (Central Province), 70 in Mkushi (Luapula Province) and 46 in Siavonga (Southern Province). The reduced number of respondents was attributed to Table I shows the sociodemographic characteristics of the main respondent at the time of the survey.

Table 1. Sociodemographic Characteristics of Respondents, Month 24

Variable	Overall
Age of Respondent (mean, SD)	37.7(11.4)
Gender of Main Respondent, n (%)	
Male	81(46.8)
Female	92(53.2)
Relationship to Head of Household	
Head of household	95(54.9)
Spouse	55(31.8)
Son	5(2.9)
Daughter	8(4.6)
Other Relative	10(5.8)
Province (District), n (%)	
Kapiri Mposhi	57(32.9)
Mkushi	70(40.5)
Siavonga	46(26.6)
Total	173(100)

Among the 173 participants, 69.9 % stated that no chemical including Insecticide Residual Spray (IRS) after the houses were painted.

Adverse Effects

Table 2. Adverse Effects Experienced since Last Survey

Ill Since Last Survey	Intervention, n (%)	Control, n (%)	Total
No	60(77.9)	82 (82)	142 (82.1)
Yes	17 (22.1)	14 (14.6)	31 (17.9)
Total	77(100.00)	96 (100.00)	173 (100.00)

Participants were asked if they had felt ill since the last survey. In the intervention group, 77.9% said they did not fall ill since the last survey; similarly, about 82% of respondents in the control said they had not fallen ill since the last survey.

The 14 respondents who reported feeling ill after painting were asked if they or any member of their family experienced a list of symptoms. The results are summarized in Table 3 by study arm for those who replied “yes”. All of participants who responded “yes” to the symptoms below received drug treatment for their symptoms. Participants listed the following as drugs they received: Panadol, Coartem, and/or medication for cough/flu.

Table 3. Adverse Effects since Painting, Month 24

Symptoms	Intervention	Control	Total
Allergic/Immunological			
Rash	2(50)	2(50)	4(100)
Sneezing	8(72.7)	3(27.3)	11(100)
Redness of Skin	1(100)	-	1(100)
Cardiac			
Palpitation	-	-	-
Swelling of limbs	-	-	-
Hypotension	-	-	-
Hypertension	-	-	-
General			
Fatigue	3(37.5)	5(62.5)	8(100)
Fever	9(50)	9(50)	18(100)
Headache	9(50)	9(50)	18(100)
Insomnia	-	2(100)	2(100)
Chills	2(33.3)	4(66.7)	6(100)
Sweating	5(62.5)	3(37.5)	8(100)
Dermatologic			
Dry skin	-	-	-
Itchy skin	4(80)	1(20)	5(100)
Ear/Nose/Throat			
Voice change	4(80)	1(20)	5(100)
Hearing loss	1(100)	-	1(100)
Eyes/Ophthalmologic			
Redness of eyes	-	-	-
Tearing	1(100)	-	1(100)

Blurring of vision	-	-	-
Gastrointestinal			
Poor appetite	-	-	-
Constipation	4(80)	1(20)	5(100)
Heart burn	1(50)	1(50)	2(100)
Nausea	1(100)	-	1(100)
Musculoskeletal			
Leg cramps		2(100)	2(100)
Leg pain	1(100)	-	1(100)
Neuropsychiatric			
Mood alternation	-	-	-
Dizziness	-	-	-
Fits	-	2(100)	2(100)
Pulmonary	-	-	-
Asthma	-	-	-
Cough	8(50)	8(50)	16(100)
Difficult breathing	-	-	-

Adherence to guidelines

Participants were asked if they applied any chemical/sprayed/washed the paint since the last survey.

Most participants (92.5%) replied that they had not interfered with the paint. For those who did indicate they had interfered with the paint were new tenants that repainted the house.

Travel History

Respondents were also asked about their travel history since painting was done, including if they spent a night elsewhere other than their home. Fifty respondents (33.5%) replied that they had traveled; of this group 32(55.5%) were in the **intervention** arm. Fifteen (25.9%) respondents traveled to Lusaka, and the rest traveled within Zambia. On average, those who traveled spent about 11 nights away from home, with a minimum of 1 nights and a maximum of 90 nights. The most common responses for traveling were attending a funeral, going away to school, business trip or visiting family. Lastly, participants were asked if they slept under a mosquito net during their

travel; less than half (31%) replied they had slept under a mosquito net. Of those who replied that they had slept under a mosquito net while traveling 55.6% were in the **intervention** arm.

Section III. Results- Month 12 (Mansa and Petauke districts)

Demographics

A total of 184 respondents were interviewed during Safety Assessment Month 12: 91 respondents in Petauke (Eastern Province), and 93 in Mansa (Luapula Province)). Table I shows the sociodemographic characteristics of the main respondent at the time of the survey.

Table 1. Sociodemographic Characteristics of Respondents, Month 12

Variable	Overall
Age of Respondent (mean, SD)	38.8(13.1)
Gender of Main Respondent, n (%)	
Male	73(39.7)
Female	111(60.3)
Relationship to Head of Household	
Head of household	83(45.1)
Spouse	63(34.2)
Son	13(7.1)
Daughter	19(10.3)
Brother	1(0.54)
Other Relative	5(2.7)
Province (District), n (%)	
Eastern (Petuake)	91(49.5)
Luapula (Mansa)	93(50.5)
Total	184(100)

Among the 184 participants, 98.9 % stated that no chemical including Insecticide Residual Spray (IRS) after the houses were painted.

Adverse Effects

Table 2. Adverse Effects Experienced since Last Survey

Ill Since Last Survey	Intervention, n (%)	Control, n (%)	Total

No	90(93.7)	80 (91)	170 (92.4)
Yes	6 (6.3)	8 (9)	14 (7.6)
Total	96(100.00)	88 (100.00)	184 (100.00)

Participants were asked if they had felt ill since the last survey. In the intervention group, 93.7% said they did not fall ill since the last survey; similarly, about 91% of respondents in the control said they had not fallen ill since the last survey.

The 14 respondents who reported feeling ill after painting were asked if they or any member of their family experienced a list of symptoms. The results are summarized in Table 3 by study arm for those who replied “yes”. All of participants who responded “yes” to the symptoms below received drug treatment for their symptoms. Participants listed the following as drugs they received: Panadol, Coartem, and/or medication for cough/flu. About 84.6% were prescribed medication for malaria.

Table 3. Adverse Effects since Painting, Month 12

Symptoms	Intervention	Control	Total
Allergic/Immunological			
Rash	0	1(100)	1(100)
Sneezing	3(60)	2(40)	5(100)
Redness of Skin	-	-	-
Cardiac			
Palpitation	-	-	-
Swelling of limbs	-	-	-
Hypotension	-	-	-
Hypertension	-	-	-
General			
Fatigue	3(42.9)	4(57.1)	7(100)
Fever	4(50)	4(50)	8(100)
Headache	4(44.4)	5(55.6)	9(100)
Insomnia	1(100)	-	1(100)
Chills	2(100)	-	2(100)
Sweating	2(50)	2(50)	4(100)
Dermatologic			
Dry skin	1(100)	-	1(100)
Itchy skin	-	-	-

Ear/Nose/Throat			
Voice change	-	-	-
Hearing loss	-	-	-
Eyes/Ophthalmologic			
Redness of eyes	-	-	-
Tearing	-	-	-
Blurring of vision	-	-	-
Gastrointestinal			
Poor appetite	-	-	-
Constipation	1(50)	1(50)	2(100)
Heart burn	-	1(100)	1(100)
Nausea	-	-	-
Musculoskeletal			
Leg cramps	-	1(100)	1(100)
Leg pain	-	-	-
Neuropsychiatric			
Mood alternation	-	-	-
Dizziness	-	-	-
Fits	-	1(100)	1(100)
Pulmonary	-	-	-
Asthma	-	-	-
Cough	2(33.3)	4(66.6)	6(100)
Difficult breathing	-	-	-

Adherence to guidelines

Participants were asked if they applied any chemical/sprayed/washed the paint since the last survey.

Most participants (98.2%) replied that they had not interfered with the paint. For those who did indicate they had interfered with the paint were new tenants that repainted the house.

Travel History

Respondents were also asked about their travel history since painting was done, including if they spent a night elsewhere other than their home. Fifty respondents (25%) replied that they had traveled; of this group 29(63%) were in the **intervention** arm. Sixteen (34.8%) respondents traveled to Lusaka, and the rest traveled within Zambia. On average, those who traveled spent about 21 nights away from home, with a minimum of 1 nights and a maximum of 240nights. The

most common responses for traveling were attending a funeral, going away to school, business trip or visiting family. Lastly, participants were asked if they slept under a mosquito net during their travel; less than half (36%) replied they had slept under a mosquito net. Of those who replied that they had slept under a mosquito net while traveling 52.9% were in the **intervention** arm.

Section IV. Entomological Assessment Results (Kapiri Mposhi, Mkushi, Siavonga, PETAUKE AND MANSA districts)

Mosquito collection, classification and data management:

Every morning at 7am, mosquitoes were collected from the CDC light traps. The mosquitoes were then separated at genus level by the trained CHWs. The collected mosquitoes were then transported to the National Malaria Elimination Centre and identified morphologically, using identification keys and sorted by entomology laboratory technicians. The females will further be classified into their blood feeding stages either unfed, fed or gravid. For con bio-assays mosquitoes were kept in cups with sugar and observed for 24hrs in a humidified, ventilated, shaded field insectary to observe rates of delayed mortality. The mosquitoes were desiccated over anhydrous calcium sulphate and stored at room temperature. The data was then initially entered on standardized paper forms with well-established data dictionaries and linkage structure and then entered onto standardized CSV templates which exactly match the structure of the CSV form. These filled templates were then uploaded to the secure server which we extracted the data and append it to the database in a consistent format.

Results

In all the five districts, no *anopheles* mosquitoes have been caught indoors; therefore, all the analysis was based on *Culex* mosquitoes. For insecticide resistance monitoring, we did not collect enough samples, therefore no meaningful inferences could be made at this point in time. However, this activity still continues under the insecticide resistance management of the National Malaria Elimination programme and results will be shared in the due course.

Siavonga

There were no mosquitoes captured indoors hence the intervention and control arms were not compared relative to indoor resting densities while the mortality was 95% at month one, 75% at

month two, 55% at month three to 38% in month six, 60% at month 12 and at month 24 it was 24%.

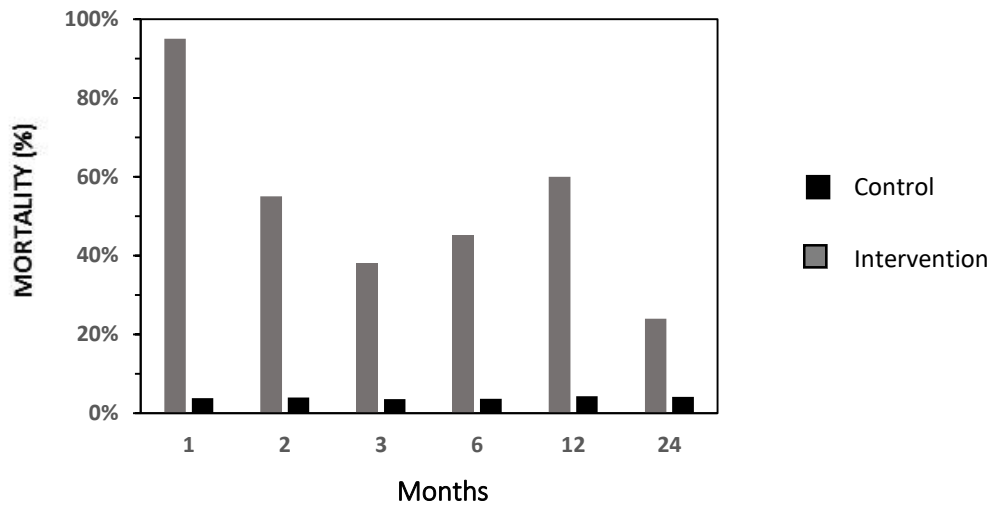


Fig 1: Residual efficacy of AMP in Siavonga

Kapiri-Mposhi

A total of 371 mosquitoes were collected indoors in Kapiri-mposhi district. A similar pattern was equally observed in the sense that there was a borderline significant difference between the indoor captures of mosquitoes in the intervention area relative to the control (Relative Rate (RR) [9], $P=0.054$) while mortality in month one was 83%, month two 72%, month three 68%, month 6 mortality reduced to 45%, month 12 was 43% and lastly month 24 mortality was at 21%

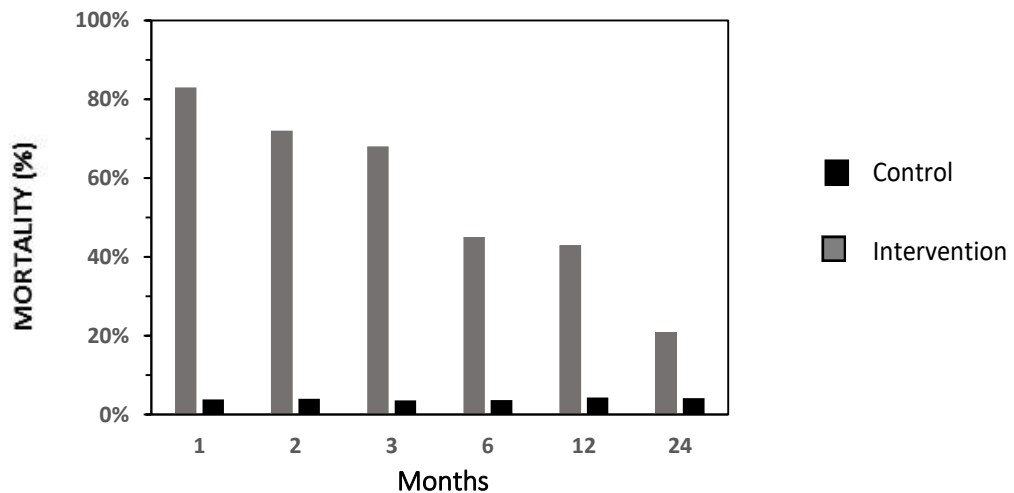


Fig 2: Residual efficacy of AMP in Kapiri Mposhi

Mkushi

A total of 223 mosquitoes were collected in Mkushi indoors and there was a borderline significant difference between the intervention and the control areas (Relative Rate (RR) [10], $P=0.05$) while the residual efficacy at month one was 83%, month two was 72%, month 3 was 68%, month 6 was 45% and month twelve came to 43% and month 24 it was 28% (Fig 3 below).

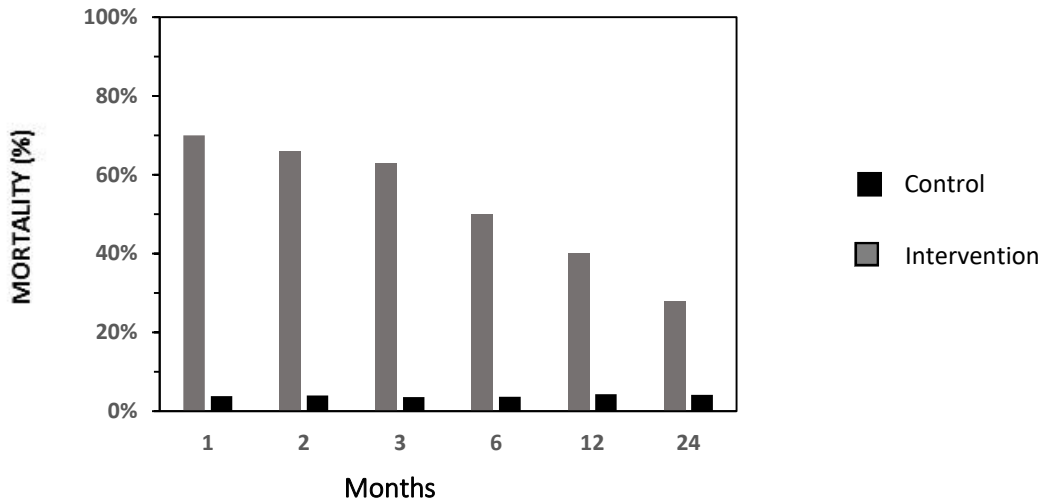


Fig 3: Residual efficacy of AMP in Mkushi.

Mansa

A total of 288 culex mosquitoes were collected in both control and the intervention areas while the Month one had a mortality of about 96%, month two 88%, month three 40%, month five 56% and month twelve 50% respectively, see figure 4 below. There was also a significant difference ($P=0.004$) in indoor mosquito collections between the intervention and control areas.

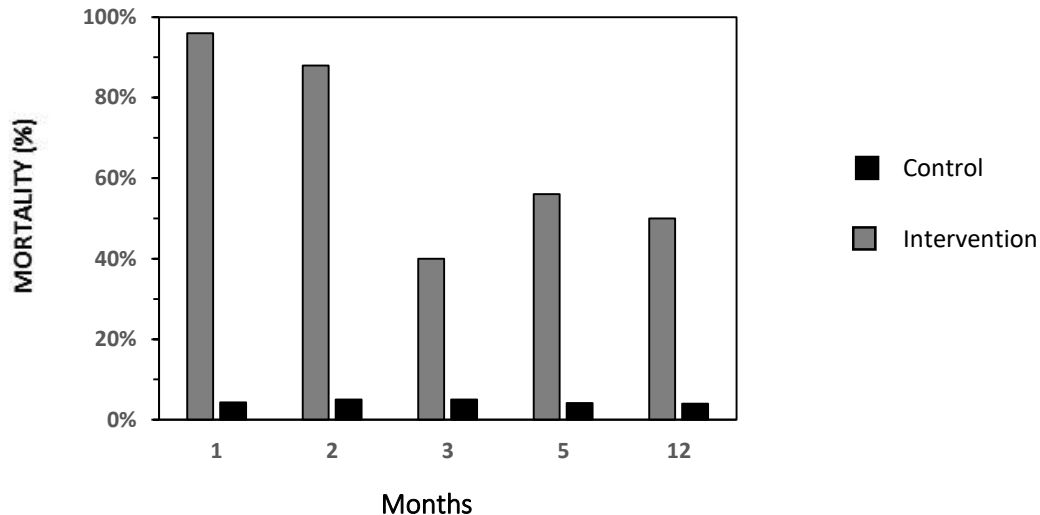


Figure 4: Residual efficacy of AMP in Mansa.

Petauke

A total of about 434 culex mosquitoes were collected in the control as well as the intervention area. Mortality for this district was exceptionally high throughout the evaluation period. Month one recorded a 100%, month two 95%, month three 84% and by month five the mortality was 83% while month twelve it was about 74%, see figure five below. There was again a significant difference ($P=0.003$) in indoor mosquito collections between the control relative to the intervention area.

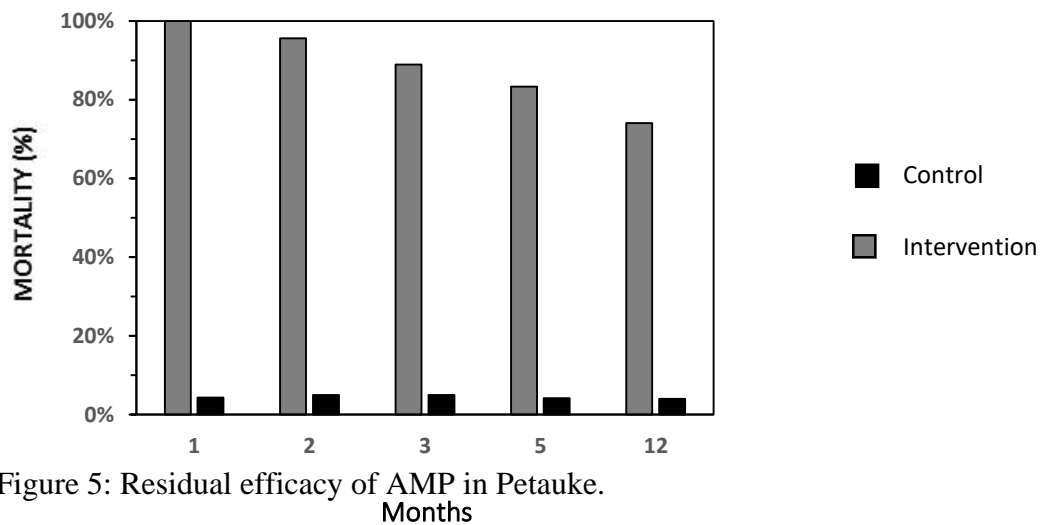


Figure 5: Residual efficacy of AMP in Petauke.
Months

SECTION VI. CONCLUSION/WAY FORWARD

No major adverse effects were seen during the safety assessments. Due to the commonality of the symptoms assessed (i.e., cough, fever, etc.) in the general population, we cannot decisively say they are linked to the Anti-Mosquito Paint versus other environmental or biological factors. All participants were told to continue to seek medical care if they felt ill and to contact the local PI or their nearest District Health Office if they had any concerns. The next safety assessment for Mansa and Petauke will be conducted on Month 6 & Month 12 for Kapiri Mposhi, Mkushi, & Siavonga. The Entomological Efficacy Assessment conducted by the National Malaria Elimination Centre found the following:

- Surprisingly no *Anopheles mosquitoes* were captured in both intervention and control areas, this could possibly be due to repellent and irritant effect of the paint.
- The residual efficacy in all the three districts had dropped down to below the 80% WHO threshold by month 6.
- However, AMP significantly reduced indoor resting densities of culex mosquitoes and no anopheles mosquitoes were captured across the three districts.
- There is need for Kansai Plascon to start looking at paint formulations using next generation insecticide active ingredients so as to help mitigate against insecticide resistance. Other alternatives may include use of PBOs with pyrethroids as an effective way of managing enzyme based resistance mechanisms which are wide spread in Zambia.
- There also might be need to optimise the active ingredient as a polymer enhanced formulation for longer residual efficacy.

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Annex 1. Month 0 Results (Petauke & Mansa Districts)

Demographics

A total of 206 respondents were interviewed during Safety Assessment Month 0: 112 respondents in Mansa district (Luapula Province) (8 more than at baseline), and 94 in Petauke district (Eastern Province). Table I shows the sociodemographic characteristics of the main respondent at the time of the survey.

Table 1. Sociodemographic Characteristics of Respondents, Month 0

Variable	Overall
Age of Respondent (mean, SD)	37.2 (1.09)
Gender of Main Respondent, n (%)	
Male	50 (24.3)
Female	156 (75.7)
Relationship to Head of Household	
Head of household	79 (38.4)
Spouse	68 (33.0)
1 Daughter	26 (12.6)
Sister	10 (4.9)
Other Relative	23 (11.1)
Province, n (%)	
Luapula	112 (54.4)
Eastern	94 (45.6)
District, n (%)	
Mansa	112 (54.4)
Petauke	94 (45.6)
Intervention Control	
Intervention	131 (63.6)
Control	75 (36.4)

Among the 206 participants, 173 (84.0%) had their home sprayed with Insecticide Residual Spray (IRS) in the past year. However, about 15% of participants did not know when their home was last sprayed by IRS. On average, participants had their home sprayed about 2 months ago (SD=0.16). When asked if they experienced any ill health after spraying, 19 participants (9%) indicated they had experienced ill health post-IRS; 84% were in the **intervention** arm. Of those who indicated

they felt ill and sought health services, 50% responded the final diagnosis was malaria; 83% were in the **intervention** arm.

Adverse Effects

Table 2. Adverse Effects Experienced

Ill After Home was Painted with AMP	Intervention, n (%)	Control, n (%)	Total
No	111 (64.2)	62 (35.8)	173 (100.0)
Yes	20 (60.6)	13 (39.4)	33 (100.0)

Participants were also asked if they felt ill after home was painted with the Anti-Mosquito Paint. Of the 206 participants, only 33 (16.0%) said they felt ill after home was painted, of this group 60.6% were in the **intervention** arm. For those who said they felt ill after home was painted, we asked about the status of their health prior to painting by asking them to qualify their prior health as “good,” “poor,” or “unknown.” All (100%) replied that they were in good health prior to painting.

The 33 respondents who reported feeling ill after painting were asked if they or any member of their family experienced a list of symptoms. The results are summarized in Table 3 by study arm for those who replied “yes”. About half of participants who responded “yes” to the symptoms below received drug treatment for their symptoms; 62.5% were in the **intervention** arm. Participants listed the following as drugs they received: Panadol, Coaterm, Amoxil, Miloxyl, Piritone, malaria prophylaxis, Hydrocortisone, and/or medication for cough/flu.

Table 3. Adverse Effects since Painting, Month 0

Symptoms	Intervention	Control	Total
<i>Allergic/Immunological</i>			
Rash	1 (50.0)	1 (50.5)	2 (100.0)
Sneezing	12 (54.6)	10 (45.5)	22 (100.0)
Redness of Skin	1 (100.0)	-	1 (100.0)
<i>Cardiac</i>			
Palpitation	-	-	-
Swelling of limbs	1 (100.0)	-	1 (100.0)
Hypotension	1 (100.0)	-	1 (100.0)
Hypertension	1 (100.0)	-	1 (100.0)

<i>General</i>			
Fatigue	3 (100.0)	-	3 (100.0)
Fever	7 (70.0)	3 (30.0)	10 (100.0)
Headache	11 (57.9)	8 (42.1)	19 (100.0)
Insomnia	-	-	-
Chills	-	1 (100.0)	1 (100.0)
Sweating	-	-	-
<i>Dermatologic</i>			
Dry skin	-	-	-
Itchy skin	1 (50.0)	1 (50.0)	2 (100.0)
<i>Ear/Nose/Throat</i>			
Voice change	1 (50.0)	1 (50.0)	2 (100.0)
Hearing loss	-	-	-
<i>Eyes/Ophthalmologic</i>			
Redness of eyes	1 (33.3)	2 (66.7)	3 (100.0)
Tearing	1 (50.0)	1 (50.0)	2 (100.0)
Blurring of vision	-	1 (100.0)	1 (100.0)
<i>Gastrointestinal</i>			
Poor appetite	2 (100.0)	-	2 (100.0)
Constipation	-	-	-
Heart burn	-	-	-
Nausea	3 (75.0)	1 (25.0)	4 (100.0)
<i>Musculoskeletal</i>			
Leg cramps	-	-	-
Leg pain	-	-	-
<i>Neuropsychiatric</i>			
Mood alternation	-	-	-
Dizziness	4 (80.0)	1 (20.0)	-
Fits	-	-	-
<i>Pulmonary</i>			
Asthma	-	-	-
Cough	11 (55.0)	9 (45.0)	20 (100.0)
Difficult breathing	5 (71.4)	2 (28.6)	7 (100.0)

Adherence to guidelines

Participants were asked if they applied any chemical/sprayed/washed the paint after Kansai painting was finished. About all participants (99.5%) replied that they had not interfered with the paint.

Travel History

Respondents were also asked about their travel history since painting was done, including if they spent a night elsewhere other than their home. Only 14 respondents (6.8%) replied that they had traveled, of this group 9 (64.3%) were in the **intervention** arm. Five (35.7%) respondents traveled to Lusaka, one traveled outside Zambia to Malawi, and the rest traveled within Zambia. On average, those who traveled spent about 12 nights away from home, with a minimum of 1 night and a maximum of 30 nights. The most common responses for traveling were attending a funeral, going away to school, or visiting family. Lastly, participants were asked if they slept under a mosquito net during their travel; 50% replied they had slept under a mosquito net. Of those who replied that they had slept under a mosquito net while traveling 85.7% were in the **intervention** arm.

Annex 2. Month 0 Results (Kapiri Mposhi, Mkushi, & Siavonga Districts)

Demographics

A total of 193 respondents were interviewed during Safety Assessment Month 0: 56 respondents in Kapiri Mposhi district, 77 in Mkushi district, and 60 in Siavonga. In Kapiri Mposhi and Mkushi, a total of 7 households (4 in Kapiri Mposhi & 3 in Mkushi) could not be reached during this assessment. Table I shows the sociodemographic characteristics of the main respondent at the time of the survey.

Table 1. Sociodemographic Characteristics of Respondents, Month 0

Variable	Overall
Age of Respondent (mean, SD)	33.2 (11.9)
Gender of Main Respondent, n (%)	
Male	69 (35.8)
Female	124 (65.3)
Relationship to Head of Household	
Head of household	77 (39.0)
Spouse	65 (33.7)
Son	10 (5.2)
Sister	9 (4.7)
Brother	5 (2.6)
Other Relative	30 (15.5)
Province, n (%)	
Central	133 (68.9)
Southern	60 (30.0)
District, n (%)	
Kapiri Mposhi	56 (29.0)
Mkushi	77 (39.9)
Siavonga	60 (31.1)

Among the 193 participants, 149 (77.2%) had their home sprayed with Insecticide Residual Spray (IRS) in the past year. On average, participants had their home sprayed about 7 months ago (SD=12.25). When asked if they experienced any ill health after spraying, only 2 respondents responded “yes.” Both sought health services and responded that their final diagnosis was malaria.

Adverse Effects

Participants were also asked if they felt ill after home was painted with the Anti-Mosquito Paint.

Of 193 participants, 28 (17.0%) said they felt ill after home was painted. For those who said they felt ill after home was painted, we asked about the status of their health prior to painting by asking them to qualify their prior health as “good,” “poor,” or “unknown.” The majority (92.9%) said they were in “good” health prior to painting. For the two (2) respondents who responded they were already in poor health prior to painting, one said they were suffering from malaria, while the other said they were suffering from diarrhea.

The 28 respondents who reported feeling ill after painting were asked if they or any member of their family experienced a list of symptoms. The results are summarized in Table 2. Half of participants who responded “yes” to the symptoms below received drug treatment for their symptoms. Participants listed the following as drugs they received: Panadol, Coaterm, Amoxil, Miloxyl, Piritone, malaria prophylaxis, Flagyl, and/or medication for cough/flu.

Table 2. Adverse Effects since Painting, Month 0

Symptoms	Yes n (%)	No n (%)
<i>Allergic/Immunological</i>		
Rash	4 (14.3)	24 (85.7)
Sneezing	12 (42.7)	16 (57.1)
Redness of Skin	-	28 (100.0)
<i>Cardiac</i>		
Palpitation	1 (3.6)	27 (96.4)
Swelling of limbs	1 (3.6)	27 (96.4)
Hypotension	-	28 (100.0)
Hypertension	-	28 (100.0)
<i>General</i>		
Fatigue	2 (7.1)	26 (92.9)
Fever	12 (42.7)	16 (57.1)
Headache	15 (53.6)	13 (46.4)
Insomnia	1 (3.6)	27 (96.4)
Chills	3 (10.7)	25 (89.3)
Sweating	4 (14.3)	24 (85.7)
<i>Dermatologic</i>		
Dry skin	-	28 (100.0)

Itchy skin	2 (7.1)	26 (92.9)
<i>Ear/Nose/Throat</i>		
Voice change	-	28 (100.0)
Hearing loss	-	28 (100.0)
<i>Eyes/Ophthalmologic</i>		
Redness of eyes	-	28 (100.0)
Tearing	-	28 (100.0)
Blurring of vision	1 (3.6)	27 (96.4)
<i>Gastrointestinal</i>		
Poor appetite	4 (14.3)	24 (85.7)
Constipation	-	28 (100.0)
Heart burn	-	28 (100.0)
Nausea	8 (28.6)	20 (71.4)
<i>Musculoskeletal</i>		
Leg cramps	1 (3.6)	27 (96.4)
Leg pain	-	28 (100.0)
<i>Neuropsychiatric</i>		
Mood alternation	1 (3.6)	27 (96.4)
Dizziness	5 (17.9)	23 (82.1)
Fits	1 (3.6)	27 (96.4)
<i>Pulmonary</i>		
Asthma	-	28 (100.0)
Cough	17 (60.7)	11 (39.3)
Difficult breathing	2 (7.1)	26 (92.9)

Adherence to guidelines

Participants were asked if they applied any chemical/sprayed/washed the paint after Kansai painting was finished. Only 5 participants (2.6%) of respondents replied that they had interfered with the paint. Of the 5, 4 (80%) said they sprayed the house with Target, while 1 said they used Doom to kill flies during the day.

Travel History

Respondents were also asked about their travel history since painting was done, including if they spent a night elsewhere other than their home. Twenty-two (11.4%) respondents said they had traveled. Eight (36.4%) respondents traveled to Lusaka, one traveled outside Zambia to Botswana, and the rest traveled within Zambia. On average, those who traveled spent about 12 nights away from home, with a minimum of 1 night and a maximum of 3 months. The most common responses

for traveling were for work, visiting family, or attending a funeral. Lastly, participants were asked if they slept under a mosquito net during their travel. Only 7 (31.8%) replied that they slept under a mosquito net.

ANNEX 3: RESULTS- MONTH 6 (KAPIRI MPOSHI, MKUSHI, & SIAVONGA DISTRICTS)

Demographics

A total of 183 respondents were interviewed during Safety Assessment Month 6: 55 respondents in Kapiri Mposhi (Central Province), 73 respondents in Mkushi (Central Province), and 55 in Siavonga (Southern Province). Table I shows the sociodemographic characteristics of the main respondent at the time of the survey.

Table 1. Sociodemographic Characteristics of Respondents, Month 6

Variable	Overall
Age of Respondent (mean, SD)	35.1 (0.96)
Gender of Main Respondent, n (%)	
Male	59 (32.24)
Female	124 (67.76)
Relationship to Head of Household	
Head of household	91 (49.73)
Spouse	55 (30.05)
Daughter	14 (7.65)
Other Relative	23 (12.57)
District, n (%)	
Kapiri Mposhi	55 (30.05)
Mkushi	73 (39.89)
Siavonga	55 (30.05)
Intervention Control	
Intervention	92 (50.27)
Control	91 (49.73)

Among the 183 participants, 68.31% had their home sprayed with Insecticide Residual Spray (IRS) in the past year. On average, participants had their home sprayed about 20 months ago (SD=2.25).

Adverse Effects

Table 2. Adverse Effects Experienced since Last Survey

Ill Since Last Survey	Intervention, n (%)	Control, n (%)	Total
No	74 (80.43)	72 (79.12)	146 (79.78)
Yes	18 (19.57)	19 (20.88)	37 (20.22)
Total	92 (100.00)	91 (100.00)	183 (100.00)

Participants were asked if they had felt ill since the last survey. In the intervention group, 80% said they did not fall ill since the last survey; similarly, about 80% of respondents in the control said they had not fallen ill since the last survey.

The 37 respondents who reported feeling ill after painting were asked if they or any member of their family experienced a list of symptoms. The results are summarized in Table 3 by study arm for those who replied “yes”. About 70% of participants who responded “yes” to the symptoms below received drug treatment for their symptoms; 42.31% were in the **intervention** arm. Participants listed the following as drugs they received: Panadol, Coartem, Amoxil, Piritone, and/or medication for cough/flu. About 70% were prescribed Coartem to treat malaria.

Table 3. Adverse Effects since Painting, Month 6

Symptoms	Intervention	Control	Total
<i>Allergic/Immunological</i>			
Rash	1 (20.00)	4 (80.00)	5 (100.00)
Sneezing	7 (70.00)	3 (30.00)	10 (100.00)
Redness of Skin	1 (100.00)	-	1 (100.0)
<i>Cardiac</i>			
Palpitation	-	-	-
Swelling of limbs	-	-	-
Hypotension	1 (100.00)	-	1 (100.00)
Hypertension	4 (66.67)	2 (33.33)	6 (100.00)
<i>General</i>			
Fatigue	4 (50.00)	4 (50.00)	8 (100.00)
Fever	6 (31.58)	13 (68.42)	13 (100.00)
Headache	8 (38.10)	13 (61.90)	21 (100.00)
Insomnia	-	1 (100.00)	1 (100.00)
Chills	3 (42.86)	4 (57.14)	7 (100.00)
Sweating	1 (100.00)	-	1 (100.00)
<i>Dermatologic</i>			
Dry skin	-	-	-
Itchy skin	2 (66.67)	1 (33.33)	3 (100.00)
<i>Ear/Nose/Throat</i>			
Voice change	1 (100.00)	-	1 (100.00)
Hearing loss	-	-	-
<i>Eyes/Ophthalmologic</i>			
Redness of eyes	-	1 (100.00)	1 (100.00)
Tearing	-	1 (100.00)	1 (100.00)
Blurring of vision	-	-	-

<i>Gastrointestinal</i>			
Poor appetite	-	1 (100.00)	1 (100.00)
Constipation	-	-	-
Heart burn	-	-	-
Nausea	1 (50.0)	1 (50.00)	2 (100.00)
<i>Musculoskeletal</i>			
Leg cramps	0	1 (100.00)	1 (100.00)
Leg pain	-	-	-
<i>Neuropsychiatric</i>			
Mood alternation	-	1 (100.00)	1 (100.00)
Dizziness	1 (33.33)	2 (66.67)	3 (100.00)
Fits	1 (100.00)	-	1 (100.00)
<i>Pulmonary</i>			
Asthma	-	-	-
Cough	6 (54.44)	5 (45.45)	11 (100.00)
Difficult breathing	1 (100.00)	-	1 (100.00)

Adherence to guidelines

Participants were asked if they applied any chemical/sprayed/washed the paint since the last survey.

Most participants (95.08%) replied that they had not interfered with the paint. For those who did indicate they had interfered with the pain, more than half replied that they had sprayed Doom.

Travel History

Respondents were also asked about their travel history since painting was done, including if they spent a night elsewhere other than their home. Forty-five respondents (24.59%) replied that they had traveled; of this group 30 (66.67) were in the **intervention** arm. Fourteen (31.11%) respondents traveled to Lusaka, and the rest traveled within Zambia. On average, those who traveled spent about 18 nights away from home, with a minimum of 1 nights and a maximum of 90 nights. The most common responses for traveling were attending a funeral, going away to school, or visiting family. Lastly, participants were asked if they slept under a mosquito net during their travel; less than half (42.22%) replied they had slept under a mosquito net. Of those who replied that they had slept under a mosquito net while traveling 57.89% were in the **intervention** arm.

ANNEX 5. RESULTS- MONTH 6 (PETAUKE & MANSA DISTRICTS)

Demographics

A total of 198 respondents were interviewed during Safety Assessment Month 3: 100 respondents in Mansa district (Luapula Province) and 98 in Petauke district (Eastern Province). Table I shows the sociodemographic characteristics of the main respondent at the time of the survey.

Table 1. Sociodemographic Characteristics of Respondents, Month 0

Variable	Overall
Age of Respondent (mean, SD)	37.8 (1.00)
Gender of Main Respondent, n (%)	
Male	73 (36.87)
Female	125 (63.13)
Relationship to Head of Household	
Head of household	92 (46.46)
Spouse	63 (31.82)
Daughter	18 (9.09)
Other Relative	25 (12.63)
District, n (%)	
Mansa	100 (50.51)
Petauke	98 (49.49)
Intervention Control	
Intervention	93 (46.97)
Control	105 (53.03)

Among the 198 participants, 179 (90.40%) had their home sprayed with Insecticide Residual Spray (IRS) in the past year. On average, participants had their home sprayed about 5 months ago (SD=0.68).

Adverse Effects

Table 2. Adverse Effects Experienced since Last Survey

Ill Since Last Survey	Intervention, n (%)	Control, n (%)	Total
No	80 (86.02)	94 (89.52)	174. (87.88)
Yes	13 (13.98)	11 (10.48)	24 (12.12)
Total	93 (100.00)	105 (100.00)	198 (100.00)

Participants were asked if they had felt ill since the last survey. In the intervention group, 86% said they did not fall ill since the last survey; similarly, almost 90% of respondents in the control said they had not fallen ill since the last survey.

The 24 respondents who reported feeling ill after painting were asked if they or any member of their family experienced a list of symptoms. The results are summarized in Table 3 by study arm for those who replied “yes”. About 80% of those who responded “yes” to the symptoms below received drug treatment for their symptoms; 61.11% were in the **intervention** arm. Participants listed the following as drugs they received: Panadol, Coartem, Amoxil, Sceptin, and Piritone. Seventy-two percent (72%) of respondents received Coartem for treatment of malaria.

Table 3. Adverse Effects since Painting, Month 3

Symptoms	Intervention	Control	Total
<i>Allergic/Immunological</i>			
Rash	4 (57.14)	3 (42.86)	7 (100.0)
Sneezing	5 (38.46)	8 (61.54)	13 (100.0)
Redness of Skin	1 (100.0)	-	1 (100.0)
<i>Cardiac</i>			
Palpitation	1 (100.0)	-	1 (100.0)
Swelling of limbs	2 (100.)	-	2 (100.0)
Hypotension	-	-	-
Hypertension	-	-	-
<i>General</i>			
Fatigue	4 (66.67)	2 (33.33)	6 (100.0)
Fever	9 (69.23)	4 (30.77)	13 (100.0)
Headache	9 (53.94)	8 (47.06)	17 (100.0)
Insomnia	-	-	-
Chills	-	1 (100.0)	1 (100.0)
Sweating	-	-	-
<i>Dermatologic</i>			
Dry skin	1 (100.0)	-	1 (100.0)
Itchy skin	1 (50.0)	1 (50.0)	2 (100.0)
<i>Ear/Nose/Throat</i>			
Voice change	-	-	-
Hearing loss	-	-	-
<i>Eyes/Ophthalmologic</i>			
Redness of eyes	-	-	-
Tearing	-	-	-
Blurring of vision	-	-	-

<i>Gastrointestinal</i>			
Poor appetite	-	-	-
Constipation	-	-	-
Heart burn	-	-	-
Nausea	1 (100.0)	-	1 (100.0)
<i>Musculoskeletal</i>			
Leg cramps	1 (100.0)	-	1 (100.0)
Leg pain	-	-	-
<i>Neuropsychiatric</i>			
Mood alternation	-	-	-
Dizziness	-	-	-
Fits	-	-	-
<i>Pulmonary</i>			
Asthma	-	-	-
Cough	5 (55.56)	4 (44.44)	9 (100.0)
Difficult breathing	-	1 (100.0)	1 (100.0)

Adherence to guidelines

Participants were asked if they applied any chemical/sprayed/washed the paint since the last survey.

Most participants (93.94%) replied that they had not interfered with the paint. For those who did indicate they had interfered with the pain, one-third replied that they had sprayed Doom.

Travel History

Respondents were also asked about their travel history since painting was done, including if they spent a night elsewhere other than their home. Only 26 respondents (13.13%) replied that they had traveled, of this group 18 (69.23%) were in the **intervention** arm. Ten (38.46%) respondents traveled to Lusaka, one traveled outside Zambia to Tanzania, and the rest traveled within Zambia. On average, those who traveled spent about 15 nights away from home, with a minimum of 2 nights and a maximum of 120 nights. The most common responses for traveling were attending a funeral, going away to school, or visiting family. Lastly, participants were asked if they slept under a mosquito net during their travel; less than half (34.62%) replied they had slept under a mosquito net. Of those who replied that they had slept under a mosquito net while traveling 88.89% were in the **intervention** arm.

Annex 1. Month 9 Results (Petauke & Mansa Districts)

A total of 158 respondents were interviewed during Safety Assessment Month 9: 72 respondents in Mansa (Luapula Province), and 86 respondents in Petauke (Eastern Province)). Table I shows the sociodemographic characteristics of the main respondent at the time of the survey.

Table 1. Sociodemographic Characteristics of Respondents, Month 9

Variable	Overall
Age of Respondent (mean, SD)	36.1(15.5)
Gender of Main Respondent, n (%)	
Male	51(32.3)
Female	107(67.7)
Relationship to Head of Household	
Head of household	81(43.3)
Head of household	45(28.5)
Spouse	61(38.6)
Son	13(8.2)
Daughter	12(7.6)
Brother	2(1.3)
Sister	8(5.1)
Other Relative	17(10.8)
Province, n (%)	
Eastern	86(54.4)
Luapula	72(45.6)
District, n (%)	
Mansa	72(45.6)
Petauke	86(54.4)

Among the 187 participants, 97.6 % stated that no chemical including Insecticide Residual Spray (IRS) after the houses were painted. On average, participants had their home sprayed about 20 months ago (SD=2.25).

Adverse Effects

Table 2. Adverse Effects Experienced since Last Survey

Ill Since Last Survey	Intervention, n (%)	Control, n (%)	Total
No	69 (89.6)	69 (85.2)	138 (87.3)
Yes	8 (12.9)	12(14.8)	20 (12.7.7)
Total	77(100.00)	81 (100.00)	158 (100.00)

Participants were asked if they had felt ill since the last survey. In the intervention group, 89.6% said they did not fall ill since the last survey; similarly, about 85.2% of respondents in the control said they had not fallen ill since the last survey.

The 20 respondents who reported feeling ill after painting were asked if they or any member of their family experienced a list of symptoms. The results are summarized in Table 3 by study arm for those who replied “yes”. About 92.9% of participants who responded “yes” to the symptoms below received drug treatment for their symptoms; 37.8% were in the **intervention** arm. Participants listed the following as drugs they received: Panadol, Coartem, Amoxil, Piritone, and/or medication for cough/flu. About 70% were prescribed Coartem to treat malaria.

Table 3. Adverse Effects since Painting, Month 9

Symptoms	Intervention	Control	Total
Allergic/Immunological			
Rash	1(50)	1(50)	2(100)
Sneezing	2(40)	3(60)	5(100)
Redness of Skin	-	-	-
Cardiac			
Palpitation	0	1(100)	1(100)
Swelling of limbs	-	-	-
Hypotension	-	-	-
Hypertension	-	-	-
General			
Fatigue	1(33.2)	2(66.7)	3(100)
Fever	0	7(100)	7(100)
Headache	4(33.3)	8(66.7)	12(100)
Insomnia	-	-	-
Chills	0	2(100)	2(100)
Sweating	3(42.9)	4(57.1)	7(100)

Dermatologic			
Dry skin	-	-	-
Itchy skin	1(33.3)	2(66.7)	3(100)
Ear/Nose/Throat			
Voice change	2(100)	-	2(100)
Hearing loss	-	-	-
Eyes/Ophthalmologic			
Redness of eyes	0	1(100)	1(100)
Tearing	-	-	-
Blurring of vision	-	-	-
Gastrointestinal			
Poor appetite	0	1(100)	1(100)
Constipation	-	-	-
Heart burn	-	-	-
Nausea	-	-	-
Musculoskeletal			
Leg cramps	-	-	-
Leg pain	-	-	-
Neuropsychiatric			
Mood alternation	1(100)	0	1(100)
Dizziness	1(100)	0	1(100)
Fits	-	-	-
Pulmonary	-	-	-
Asthma	-	-	-
Cough	3(42.8)	4(57.2)	7(100)
Difficult breathing	3(100)	0	3(100)

Adherence to guidelines

Participants were asked if they applied any chemical/sprayed/washed the paint since the last survey.

Most participants (97.5%) replied that they had not interfered with the paint. For those who did indicate they had interfered with the paint were new tenants that repainted the house.

Travel History

Respondents were also asked about their travel history since painting was done, including if they spent a night elsewhere other than their home. Fifty-five respondents (34.8%) replied that they had traveled; of this group 34 (61.8%) were in the **intervention** arm. Fourteen (27%) respondents traveled to Lusaka, and the rest traveled within Zambia. On average, those who traveled spent

about 13 nights away from home, with a minimum of 1 nights and a maximum of 60 nights. The most common responses for traveling were attending a funeral, going away to school, business trip or visiting family. Lastly, participants were asked if they slept under a mosquito net during their travel; less than half (45.5%) replied they had slept under a mosquito net. Of those who replied that they had slept under a mosquito net while traveling 68% were in the **intervention** arm.

SECTION III. RESULTS- MONTH 12 (KAPIRI MPOSHI, MKUSHI, & SIAVONGA DISTRICTS)

Demographics

A total of 187 respondents were interviewed during Safety Assessment Month 12: 53 respondents in Kapiri Mposhi (Central Province), 79 respondents in Mkushi (Central Province), and 55 in Siavonga (Southern Province). Table I shows the sociodemographic characteristics of the main respondent at the time of the survey.

Table 1. Sociodemographic Characteristics of Respondents, Month 12

Variable	Overall
Age of Respondent (mean, SD)	35.4(14.5)
Gender of Main Respondent, n (%)	
Male	69(36.9)
Female	118(63.1)
Relationship to Head of Household	
Head of household	81(43.3)
Spouse	65(34.8)
Son	7(3.7)
Sister	15(8.0)
Brother	1(0.53)
Other Relative	18(9.6)
Province, n (%)	
Central	132(70.6)
Southern	55(29.4)
District, n (%)	
Kapiri Mposhi	53(28.3)
Mkushi	79(42.3)
Siavonga	55(29.4)

Among the 187 participants, 97.6 % stated that no chemical including Insecticide Residual Spray (IRS) after the houses were painted. On average, participants had their home sprayed about 20 months ago (SD=2.25).

Adverse Effects

Table 2. Adverse Effects Experienced since Last Survey

Ill Since Last Survey	Intervention, n (%)	Control, n (%)	Total
No	74 (87.1)	93 (91.2)	167 (89.3)
Yes	11 (12.9)	9 (8.8)	20 (10.7)
Total	85 (100.00)	102 (100.00)	187 (100.00)

Participants were asked if they had felt ill since the last survey. In the intervention group, 87.1% said they did not fall ill since the last survey; similarly, about 91.2% of respondents in the control said they had not fallen ill since the last survey.

The 20 respondents who reported feeling ill after painting were asked if they or any member of their family experienced a list of symptoms. The results are summarized in Table 3 by study arm for those who replied “yes”. About 86.6% of participants who responded “yes” to the symptoms below received drug treatment for their symptoms; 42.31% were in the **intervention** arm. Participants listed the following as drugs they received: Panadol, Coartem, Amoxil, Piritone, and/or medication for cough/flu. About 70% were prescribed Coartem to treat malaria.

Table 3. Adverse Effects since Painting, Month 12

Symptoms	Intervention	Control	Total
Allergic/Immunological			
Rash	3(75)	1(25)	4(100)
Sneezing	3(75)	1(25)	4(100)
Redness of Skin	-	-	-
Cardiac			
Palpitation	-	-	-
Swelling of limbs	-	-	-
Hypotension	-	-	-
Hypertension	-	-	-

General			
Fatigue	2(33.23)	4(66.7)	6(100)
Fever	5(45.5)	6(54.5)	11(100)
Headache	3(27.3)	8(72.7)	11(100)
Insomnia	-	-	-
Chills	1(50)	1(50)	2(100)
Sweating	3(60)	2(40)	5(100)
Dermatologic			
Dry skin	-	-	-
Itchy skin	4(100)	-	4(100)
Ear/Nose/Throat			
Voice change	1(100)	-	-
Hearing loss	-	-	-
Eyes/Ophthalmologic			
Redness of eyes	1(100)	-	1(100)
Tearing	-	-	-
Blurring of vision	-	-	-
Gastrointestinal			
Poor appetite	1(50)	1(50)	2(100)
Constipation	-	-	-
Heart burn	-	-	-
Nausea	-	-	-
Musculoskeletal			
Leg cramps	-	-	-
Leg pain	-	-	-
Neuropsychiatric			
Mood alternation	1(50)	1(50)	2(100)
Dizziness	1(100)	-	1(100)
Fits	-	-	-
Pulmonary	-	-	-
Asthma	-	-	-
Cough	2(66.7)	1(33.3)	3(100)
Difficult breathing	-	-	-

Adherence to guidelines

Participants were asked if they applied any chemical/sprayed/washed the paint since the last survey.

Most participants (97.8%) replied that they had not interfered with the paint. For those who did indicate they had interfered with the paint were new tenants that repainted the house.

Travel History

Respondents were also asked about their travel history since painting was done, including if they spent a night elsewhere other than their home. Fifty respondents (26.57%) replied that they had traveled; of this group 24 (48.0%) were in the **intervention** arm. Fourteen (52%) respondents traveled to Lusaka, and the rest traveled within Zambia. On average, those who traveled spent about 13 nights away from home, with a minimum of 1 nights and a maximum of 60 nights. The most common responses for traveling were attending a funeral, going away to school, business trip or visiting family. Lastly, participants were asked if they slept under a mosquito net during their travel; less than half (42%) replied they had slept under a mosquito net. Of those who replied that they had slept under a mosquito net while traveling 42.9% were in the **intervention** arm.