

# Primary school students' poetic malaria messages in Ethiopia: A qualitative content analysis

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## Research article

**Keywords:** Content analysis, Poems, Malaria messages, Schools, Malaria elimination, Jimma-Ethiopia

**Posted Date:** October 6th, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-74856/v1>

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## Abstract

**Background:** Engagement of schools in malaria control is an emerging strategy. Little is known about involvement of students on malaria message developments. This study evaluated message contents of primary school students' malaria poems.

**Methods:** A qualitative content analysis was conducted to explore malaria messages conveyed in poems produced by students. Twenty poems were purposively selected from twenty schools across rural villages in five districts of Jimma Zone. Data were analysed using Atlas.ti version 7.1.4 software. Message contents and metaphors were presented using central themes and categories in supportive quotations. Finally, message contents were quantified in frequency.

**Results:** The ages of the poetic students ranged from 12 to 19 years old. A total of 602 specific malaria contents generated. The contents were put into 21 categories under five central themes. Contents about malaria-related knowledge include causation and modes of transmission, mosquito breeding and biting, signs and symptoms, caring for insecticide-treated nets (ITNs), and ways of prevention. The poems conveyed the perception of threats from malaria. Effectiveness of prevention methods was profoundly reported related to adaption of ITNs, environmental cleaning, indoor residual spray (IRS), treatment for fever, and drug adherence practices. Misconceptions, beliefs, and malpractices were mentioned in the poems pertaining to causes and drug-use. Direct calls were present to adopt ITN, IRS, clean surroundings, treatment, and drug use. Message about the severity of malaria, distinguishable signs and symptoms, manifest calls to community participation towards malaria elimination, knowledge of preventive ways, and effectiveness of ITN use were the most commonly conveyed contents. Metaphoric expressions (war and death) were used to convey messages about severity and the need to manage the prognosis of malaria through active ITN utilization, which itself was metaphorically represented 'a trap' to mosquitoes.

**Conclusion:** Poetic content analysis indicated that students in primary schools are considerable malaria messages source, particularly in rural settings. Involving students in malaria programs would effectively communicate knowledge, perceptions, and promote practices by using local metaphors that set learning contexts.

## Background

Magnitudes of malaria morbidities and mortalities are still important globally, regionally, and nationally compared to the goals of eradication and elimination (1,2). Oromia is the most malaria-prone region with a large number of malaria-related risks and death in Ethiopia (3). Jimma appears to be one of the endemic zones of Oromia, although a declining trend was observed (4). There are several global initiatives and commitments to support the efforts of eliminating malaria (5–8). Community participations and ownership, communication interventions for social and behavioral changes, and scale up of workable interventions proven to enhance malaria knowledge, attitude, and practices were some of the strategies supported by most malaria programs globally (3,9–13).

Social and behavior change communication (SBCC) programs, strategies, and activities are emerging elements of effective global direction for eliminating malaria (11–17). Pieces of evidence indicate that approaching SBCC through school is one of the proven effective and efficient means of disseminating information to students and their families. School children and teachers are key agents for communicating and encouraging community-wide malaria prevention and control (3,18–22).

The current study emphasized the evaluation of one of school-based SBCC intervention on malaria that was conducted in the Jimma zone by 2017-19. Details of the intervention reported in a separate article (22). One of the interventions package involved primary school students in developing and disseminating messages to schools and broader communities. Students, particularly those who were members of health/malaria and mini-media/art clubs were supposed to engage in developing artistic malaria communication materials including poems. Then, they disseminated their materials and messages through mini-media, peer discussions, parent days, community meetings, and school opening or closing occasions. The aim of this study was to analyze the content of poetic communication materials developed by students.

Poems are pieces of lines of writing arranged in patterns to express ideas that depict human experiences, beliefs, views, imagination, and evokes different emotions. Poems commonly have titles, dominating words, stories, connotative meanings, and hidden meanings to be searched based on figurative languages (a word or phrase that a meaning is different from the literal interpretation of language) (23–27).

The analysis of poems involves reading the poems, analyzing the lines against the titles, investigating emotions, words, and stories in the poems, and interpreting figurative languages (26–29). The following are some of the types of key figurative speeches: metaphors, asserts the identity, without a connective such as “like” or a verb as “appears”, of terms that are literally incompatible; similes, unrealistic comparison is made, using like or as; personification, assigning of human characteristics to non-humans; synecdoche, is the whole is replaced by the part or the part by the whole; irony, is a statement or a situation meaning is contradicted by the presentation of the idea; metonymy, something is named that replaces something closely related to it; and paradox, is statement that seems self-contradictory but may contain an insight into life (26–31).

Content analysis is a research method that explores the content or information and symbols contained in written documents or other communication media (in this case poems) and to explore linguistic expressions and affective, cognitive, social, cultural, and historical significances (32,33). Exploring and analyzing the message contents of malaria poems developed and communicated by primary school students has multiple purposes. These are: to understand the contents of messages conveyed through the poems, collect experiences of communicating in contexts i.e., local mental models and beliefs, evaluate and adapt lessons about the students' roles in malaria communication, and empower schools and students in successful message developments for public health programs. Therefore, this study aimed to explore the message contents of malaria poems developed by students.

## **Methods**

### **Study settings and contexts**

The study was conducted in primary schools of twenty rural gandas (the lowest government administrative bodies) of the Jimma Zone between February 20 and March 5, 2020. Jimma is one of the zones of the largest Ethiopian region, Oromia. It is located in the Southwest direction 356 K.M away from Finfinne, the capital of the region. With an area of 50.52 square kilometers, Jimma zone has 21 districts, and 42 urban and 513 rural gandas. The total population of Jimma Zone is estimated to be 3.2 million, with the majority of the population living in rural areas (34). The study schools have been centers of execution for a two-year school-based malaria project aimed to advance community practices from 2017 to 2019 and in five selected higher malaria burden districts of the zone: Limmu-Kossa, Botor-Tolay, Gera, Shebe-Sombo, and Nono-Benja. In those schools, the project engaged students as malaria messengers and artistic message developers for in-school, community, and opportunistic disseminations.

### **Study design**

A qualitative content analysis was conducted on malaria poems generated by primary school students. Qualitative content analysis was used to analyze text data, and messages of communication materials to provide knowledge and understanding of the phenomenon under the study(35–38). There are three approaches of qualitative content analysis: conventional, directed, and summative. All of the three approaches are used to interpret meaning from the content of text data. The major differences among the approaches are coding schemes, origins of codes, and threats to trustworthiness (36). The current study applied conventional approach. In conventional content analysis, coding categories are derived directly from the text data. At the end of content analysis, we compared frequencies of occurrence by quantifying the underlying message contents.

### **Population and sampling**

Over the school-based malaria SBCC project periods (2017-2019), students were generating poems in all the twenty study schools. All poems ever produced in those schools were the parent population. Table 1 presents the distribution of the poems considered for analysis. Initially, eighty poems were selected across the study schools from a total count of 657 poems. A criteria sampling technique was used to select poems from school documentation based on content richness, minimum of a page length, readability, and representations by villages, schools, grades, and gender of the poet students. Poems that were unreadable, very short, and shallow in terms of content were excluded. Finally, twenty poems were considered for the content analysis. The final number of poems analyzed was decided based on the saturation of ideas upon agreement among the investigators. Nonetheless, minimum representation was given for districts, villages, schools, grades, and gender to maximize data triangulation.

Table 1  
Sampling distribution of the selected poems, schools in rural villages of Jimma zone, Oromia 2020.

Districts	Study villages where schools are located (number of poems-sex)				Sample	Sex of poet
Shebe-Sembo	M/sedecha (1F)	Y/dogena (1F)	Mirgano (1M)	Kishe (1M)	4	M(2),F(2)
Limmu-Kosa	Ambuye (1F)	Gumar (1M)	D/Gebana (1F)	C/Ifeta (1M)	4	M(2),F(2)
Gera	K/Kindibit (1M)	Sedi (1M)	G/Challa (1F)	Dusta (1F)	4	M(2),F(2)
Nono Benja	Illu (1M)	Ebicha (1M)	Amido (1M)	Kolatie (1F)	4	M(2),F(2)
Botor-Tolay	B/Adare (1F)	L/Botor (1F)	B/Barite (1M)	K/Boso (1M)	4	M(2),F(2)
*Grade(poem)	grade 5 (5)	Grade 6 (5)	Grade 7 (5)	Grade 8 (5)	20	M(10),F(10)

\*Equal poems were allocated to grades and sex of poetic students. F=Female, M=Male

## Data sources and collection methods

Five experienced individuals (three masters of public health students and two graduated bachelors) were employed to collect the poems from schools in per districts. They received training about the study and criteria of sampling, and selection of poems. Data collectors approached to the sites, secured permissions from school focal persons, reviewed documentations, and selected extra number of information rich poems. Later, the investigators chose the best poems based on readings according to representations stated in table 1.

## Data analysis

First the selected poems were word for word converted to soft copies and saved in word document. Texts with plain and straight forward meaning were translated and coded in English language. The data analyses were managed by ATLAS.ti 7.1.4 software. Coding was carried out through reading and re-reading the compiled poems. Before actual coding began, the poems were independently read by three master level investigators to identify key themes and develop a code structure. To enhance dependability, the coders each independently applied the code book to six selected and rich poems and reviewed any differences in their coding, which were discussed and resolved. The code structure later evolved as the actual coding progressed by the lead coder. Thus, peer debriefings were conducted among the initial

coders' team during coding process. The final code version was approved by two-PhD and one MPH holder experienced researchers. The final code book is referred to as supplementary file 1. Then, the lead coder analyzed the whole poems using the established structure. Texts with figurative languages were carefully interpreted to equivalent meaning based on definitions of key types of figurative speeches. The interpretations were audited by language and literature experts for accuracy. As analysis unfolds, potential categories of messages in the poems were developed by clustering codes. Themes of messages were developed by clustering the categories. Next, definitions for each category and code were developed. Tick description was provided to the themes. Finally, results were presented using major theme, categories, and specific contents supported by quotations. Moreover, counts of contents were tabulated to display frequencies their occurrence across the poems.

## Trustworthiness

The rigors of qualitative studies are kept in four main ways: credibility, dependability, transferability, and confirmability. Credibility of this study was ensured by involving team of experienced researchers, and coders for developing code book that guided data analysis. Tick descriptions provided to themes and categories of message contents, and supportive quotations add values to credibility of the contexts of interpretations. The investigators are experienced qualitative researchers, public health, and malaria experts. They were intending only to answer the question that initiated the study i.e. how effectively students can develop poems that are rich in malaria messages. Consequently, as much as possible, the investigators reported actual meanings of contents in the poems with minimal interpretation bias. To assure this, they kept subjective neutrality and bracketed themselves not to intentionally assign expertise meanings other than interpretations transpiring during coding process. Peer debriefing and daily interactions among each other kept dependability of the finding. The diversity of districts, schools, grades, and gender represented in the selected poems can increase transferability of the findings. Additionally, saturation of the finding can be witness by discussions given in reference to malaria communication programs. Finally, adequacy of the findings in revealing malaria message contents located in students' poems can be confirmed by the readers based on audits of internal evidences for the integrity of entire process, and external evidences about malaria communication programs.

## Results

### Profiles of poetic students and poems

In this study, twenty malaria poems were analyzed to understand the conveyed messages. The ages of students who developed the poems ranged from 12 to 17 years old (mean age, 14.3 years). Females and males each contributed ten poems. The students were attending schools in grades 5-8. The all poems developed by Afan Oromo language and disseminated on school mini-media, parent days, school opening and closing occasions, community gatherings, and other events organized by education and health offices. Fig.1 presents photos of selected poems.

# Message contents of malaria poems

A total of 602 specific contents generated from poems were put into twenty one categories that were lined-up along five themes about malaria prevention and control. These message contents were: knowledge about malaria and its prevention; perceptions of threat from malaria; effectiveness of preventive measures; misconceptions, beliefs and malpractices; and manifest calls to adopt malaria control behaviors and social changes. Moreover, the central themes of message contents were mainly expressed by metaphoric models and personified. Details narrated as below.

## Thematic message 1: Knowledge about malaria

Knowledge about malaria and its prevention was one of the profound contents conveyed by poems developed by students in primary schools. The main poetic message contents about knowledge of malaria include causes and modes of transmissions, mosquito breeding and biting behaviors, sign and symptoms, and ways of prevention, treatment and control of malaria. Specifications were presented below:

### Causations and mode of transmission of malaria:

The poems profoundly stressed on the cause of malaria. The poetic messages specified that malaria is caused by a parasite plasmodium that is transmitted through a bite of female mosquito by the name Anopheles that feeds on human bloods. In fact, the poems also conveyed a message content that the bite by female anopheles mosquitoes will cause malaria only when previous bite was made with someone who has the parasite plasmodium in their blood stream.

For example, one grade 5 female student from Botor-Tolay district indicated in her:

*“...All mosquitoes do not cause the disease malaria*

*It is caused by female mosquito that feeds on red blood cells*

*It is called as anopheles mosquito*

*While the parasite is known as plasmodium...”*

Another grade 5 male student of 13 from Gera district wrote:

*“...Malaria is transmitted by female anopheles mosquito*

*The causing parasite is called plasmodium.*

*The mosquito transmits the diseases to another person*

*By first sucking blood which contains plasmodium parasite*

*It further transmits the diseases to other people."*

The poems noted that a single mosquito can reach many people within a day or entire community within short period of time. By this content, the students conveyed latent message of potential risk mosquitoes can cause if barriers are consistently used in all seasons irrespective of low or reducing malaria infection.

*"...Anopheles mosquito bites a lot of people in one night*

*Not the bites alone, it the disease that is transmitting..." (Grade 7 student, Nono Benja).*

Mosquito biting behavior: Interestingly, the students also conveyed the biting behavior of the mosquitoes i.e. biting is mainly performed at night times, biting for sake of sacking blood to get elements that is required for their reproduction.

For example, one 8<sup>th</sup> grader female student from Gera district said the following in local language

*"...Afaan wayii qabdi baayyee kan bal'atuu*

*Gaafa nama hiddee hidda namaa lixuu*

*Kan nama cininitus wal hormaataafi dha*

*Yeroon inni nama cininuus sa'ati galgalaa dha..."* This literally means that the mosquito has a very sharp mouth. When it bites that sharp edge directly enters the person's bloodstream. The reason of the bite mainly is for the sake of reproduction. And the biting time is often at the evening and night.

The students' poetic messages specified that the malaria causing mosquitoes breeding sites include stagnant water, broken materials that hold water, grass, and swampy area.

For example, a grade 5 female student of 14 from Botor-Tolay district said:

*"...the mosquito breeds in broken materials that hold water,*

*Multiply in swampy and abundant in the grass*

*Often proliferate during winter, but also in summer*

*It breeds on accumulated and stagnant water*

*And lays its eggs, 50-70 at one time*

*Completes its life cycle of metamorphosis*

*Then there will be plenty of them all over the world..."*

**Signs and symptoms:** In their poems the students conveyed messages about distinguishable signs of malaria. The specifications to the signs and symptoms ranged from fever, headache, chills, feeling cold, weakness, joint pain, relapse, vomiting, and etc. For example, a grade 8 male student of 16 from Botor-Tolay said the following:

*“... These are the symptoms of malaria:*

*It warms the body and causes headache,*

*Makes you to vomit and hate food to eat,*

*It weakens the body, though you may get better,*

*It is on and off as it comes again and again,*

*It is worsening in infants and pregnant women*

*Causing to feel cold it shakes the body,*

*Finally feel fatigue and lose your consciousness...”*

Interestingly, the students noted a message content that these symptoms may relapse if they are not appropriately treated or the drugs are not completely taken. For example, one grade 5 female student from Shebe-Sembo district said the following in local language:

*“..Har'aaf nuu dhiiftuus hoo isiino boor kaati*

*Dawaa nama hiruun baayyee dhorkaasaati*

*Yoo fuudhannee fixne maaluma nuu gooti (read 2X).*” This stanza literally interpreted as; if we interrupt taking its drugs, malaria replaces at another time. It is strictly forbidden to share medicine with anyone or interrupt. We can be completely healed from malaria when we complete taking its drugs.

**Ways of prevention and control:** the students profoundly presented in their poems the knowledge about the methods of prevention, treatment, and control of malaria. ITN, IRS, and cleaning environments were the mainly presented preventive methods. In a local language, a grade 7 male student from Nono-Benja said:

*“...Karaan ittisa dhibee kanaa*

*Karaa heeddu danuusatu jira*

*Bakka hormaata bookee busaa sirritti qulqullessu*

*Mana fincaani qadaadu, qodaa cabaa bishaan kusuu gatuun ballessu*

*Boolla bishaan kuusan keessa yaasuun gogsuu*

*Raqawwan xuraawaa naannoo irraa fageessu*

*Saaphana sreee fannisuu*

*Yoo haanqinni saaphanaa jiraate dubarti ulfaaf dursa laachu*

*Daa'imman umuri shanii Gadiif fannisuu*

*Faayidaa biraaaf akka hin oolle ummata barsiisuu*

*Farra bookee busaa manatti biifsisuu.*" In this stanza, the student indicated cleaning the surrounding, sleeping under ITN (including giving priority to pregnant women and under-five year old children when there is deficit), and IRS ways of preventing malaria disease.

The students also indicated malaria is best treated at health facility including community-based health posts by following drugs as prescribed by health workers. For instance, a grade 5 male student from Gera said:

*"... When we learn that the symptoms suggest malaria*

*We need to go to health facility within one day*

*Understand and correctly practice the advice of health providers*

*Soon will manage it and will be free from the diseases..."*

## **Care for ITN:**

In the poems messages about ITN care were indicated. They mentioned ITN needs regular washing, dry under shadow, stitched when torn, and never used for any other purposes. A grade 8 male student of 17 from Nono-Benja district said:

*"...If bed net becomes dirty, wash and dry it under shade.*

*If it becomes torn, repair or mend it.*

*When it gets 6 O'clock, suspend it carefully*

*Use it wisely and do not make it for other purpose..."*

## **Thematic message 2:**

Misconceptions, beliefs, and malpractices presiding in community

In their poems the students presented some misconceptions and beliefs presiding in the community. The beliefs were mainly pertaining to the nature, causes, and prevention of malaria. Perhaps, these could be raised in reference to the knowledge contents mentioned earlier.

Misconceptions about causes: Regarding causes, the students revealed it is believed in their community that eating sugarcane, dirty foods, hungry, and cold weather are some of misperceived causes of malaria. Literally one stanza from a poem developed by a 7<sup>th</sup> grade female student of 15 from Botor-Tolay said:

*“...People talk different things about the cause of malaria*

*The cause of malaria is not what you think:*

*It is not lack/shortage of food,*

*It is not sleeping outdoors at day time.*

*If you ask me what is the right cause?*

*I will tell you there is only one, and one right cause*

*The transmitting mosquito named as anopheles*

*While the bacteria are called plasmodium...”*

## **Preventive and treatment malpractices:**

The poems picked that people shared some unhealthy norms regarding preventive/treatment of malaria: they tend to ignore seeking treatment early when signs of malaria are present, use previously saved drugs, share the drugs to each other, and using ITNs as fastening rope, sacks, etc. Regarding treatment related malpractices, one grade 6 male from Gera stated:

*“Qoricha waliif hiruun haala maaf nu taati?*

*Qqarshii keenya baasuun fayyuudhaafi miti?*

*Qooricha fuudhatani nama biraafli laachuutu mul'ata*

*Mana yaalaa deemnaan qoricha ni argannaa*

*Qoricha argannes baasne gatuu miti*

*Sirnaan fayyadamaa akka dawaa ta'utti.”* This one stanza literally is asking people about why they make habit of saving or sharing or interrupting drugs and do not seek care, and which finally advised appropriate use of drugs.

Regarding misuse of ITNs, a grade 6 male student of 16 from Botor-Tolay wrote in a local language:

*"Agoobara jedhe motummaan gaaraa kaasee hanga dakatti raabse*

*Ummanni keenya garuu battalummatti gara hojitti baase*

*Itti hojjechuun yoom hafe barbarree, boqollo, shumbura waan hunda irratti afe*

*Agobara argannee gaafa ji'a lamaa*

*Funyoosaa fo'ama jabbootaan hidhamaa*

*Waa'ee fayyaa dhifnee horiin fayyadamna*

*Kun mee sirri miti maaluumaaf gowwomna*

*Fayyaa keeyna dagannee maaliif horiin hidhanne?" These lines explicitly talked about government's commitment of mass distribution of ITN versus people's misuse as rope and sacks. It also indicated that is foolishness to misuse ITN that is intended for people's health. Finally urged people for how long they would continue to be reluctant of their health while using ITN for unintended purposes.*

### **Thematic message 3:**

Threat perceptions from malaria and risk conditions

In the context of this study theme about perceived threat refers to contents that were included in the poems regarding risk conditions, perceived risk, and perceived severity.

Perceived risk or vulnerability: Along the poems students were initiating the community to feel the risk of infection by malaria or its serious form. It seems that in the community people started ignoring the risk of attack by malaria. To illustrate this, 5<sup>th</sup> grader male student from Limmu-Kossa stated:

*"...Malaria attacks all persons:*

*Without permission and difference in age*

*Children and aged people*

*Everyone is potentially affected by it*

*It doesn't fear the fatty ones*

*And never undermine the thin*

*Everyone should keep..."*

The students indicated pregnant women and under-five children are at high risk of experiencing worsening form of malaria and needing priority for sleeping under ITN. A grade 6 female student, Nono-Benja said:

*"...Giving priority for infants and pregnant is mandatory*

*We don't mean malaria doesn't infect others*

*But it mainly hurts/affects them...*

*To save ourselves from malaria disease*

*We sleep under the bed net, especially the children and pregnant*

*They are more likely to get malaria;*

*This is because their bodies are weak and vulnerable."*

In the meantime, the poems warned the community to actively watch after their health from risk of potential sudden attacks by malaria and not ignoring seeking care anytime they have symptoms. A female student in grade 5 from Botor-Tolay mentioned:

*"...Dhukkubichaan yoo qabamne*

*Mana marfee deemu yoo baannee*

*Sa'ati 24 carraan nuuf laatame*

*Kana hunda goonaan carraan*

*Fayyuu keenya yeroo hidhoo keessatti*

*Kana itti amanaa hundumti keessani".* The lines urged the community to feel at risk, check their health regularly, and believe in seeking-care within 24-hours of symptoms onset.

## Risk conditions:

The students mentioned the presence of wastes, grasses, plants with flat leaves, swampy areas, stagnant waters, and broken utensils that are favorable or breeding of mosquitoes are also risk conditions for malaria. So long as people live in such environment they at risk of malaria.

*"... There are accumulated waters in our surrounding*

*Where the mosquitoes breed and multiply the disease.*

*They come to bite us and give us the disease.*

*So long as people don't dry accumulated water in our area." (Grade 5 male, Limmu-Kossa)*

*"...For the cause that we don't clean our environment*

*For reason we don't manage to safely dispose dirty water*

*Mosquito breeds there, and transmits the disease" (grade 8 male student, Shebe-Sombo).*

## **Perceived severity:**

The poems memorized several stories about seriousness of malaria that happened in community over the last few years. The death stories it caused and its effects on farming activities were the main examples of explanations given to seriousness of malaria. Illustrative quotation taken from 8<sup>th</sup> grader male student of 18 from Gera stated in local language:

*"...Haaxxummaa busaa mee hubadhaa*

*Lola baayyee ulfaataa dha*

*Otuma hin beekin hubde nama fixxi*

*Utuma hin yaadiin lubbu namaa baasti*

*Maalii kan busaati baayyee jabaataa dha*

*Malli busaa baayyee ulfaataa dha*

*Dhaloota fixate abboota hin jenne*

*Hundarrraa qubatte dhaloota hunda fixxee*

*Lafa mancaafte (read 2X) yommuu ilaalan*

*Ariifachisuun lubbu namaa baasaa*

*Jireenya hanqisaa lafa irraa ballessaa (read 2X)*

*Duri hunda ajjeese*

*Omishaa fi omishtumma gad xiqqeesse*

*Lammi kan koo beelatti hanbise." This portion literary explained that malaria has taken the lives of many people over the past few years, caused sudden deaths, almost killed someone from every household, and affected farming and contributed to hunger.*

## **Thematic message 4:**

Perceived effectiveness of preventive measures

Introductory knowledge contents about key malaria control measures were reported previously. The current theme elaborated how the poems presented the effectiveness of the measures in putting malaria under the control of the community.

### **Insecticide-treated nets:**

The students stressed in their poems that active use of ITN (any net) can safeguard a family and community from risk of malaria. ITN can trap malaria causing mosquitoes. ITN was presented as a frontline preventive material in the fights against malaria. An 8<sup>th</sup> grader male student from Botor-Tolay said:

*“...Bed net is a treatment*

*It has a chemical which burns malaria.*

*By it you can avoid mosquito’s contact with your bloodstream.*

*You can protect yourself from malaria by sleeping under net.”*

Indoor residual spray (IRS): It was sketched an outreach to attack mosquitoes that cause malaria. It was believed to effectively kill mosquitoes while resting indoor, and in peak breeding seasons.

*“..It is possible to eliminate malaria mosquitoes*

*By getting antimalarial chemical spray in the home.” (Grade 6 male student, Botor-Tolay).*

Cleaning surrounding: regular cleaning of compounds and surrounding environments was perceived as effective means of reducing risk conditions and chances of mosquito breeding. An 8<sup>th</sup> grader from Limmu-Kossa stated in a local language:

*“...Naannoo jirenya keenya saatitti haa ilaalamuu*

*Lola cisaa yaafne yeroo yeroon ilaalle haa qulqullefamu*

*Naannoo jirenya keenya yeroo yeroon ilaalla*

*Naannoo jirenya koo irraa si fageessa*

*Naannoo qulqulessine of irraa eeganna.”* This literally means that regular cleaning of the surrounding is effective way of protecting their locality from mosquito and malaria. In fact, the poet committed oneself

and other to engage on cleaning and get protected.

## Treatment of malaria or suggestive symptoms:

the poems promoted the nearest health facility to effectively test, ruling-out, and manage malaria. A grade 6 male of 15 from Gera said the following:

*"...If you are infected with malaria,*

*Go to the nearest health facility*

*Where you can get a treatment*

*If we recognize we have malaria symptoms*

*We should not die by sleeping in bed*

*Immediately get lifesaving treatment, which is our duty."*

## Proper use of drugs:

The poems are contented with considerable messages about malaria drugs. Relapse of malaria disease was presented as a result of failing to complete taking anti-malaria drugs. Professional prescriptions are the only best means of getting proper and quality drugs.

A grade 5 female student from Botor-Tolay stated:

*"If you observe anyone with symptoms of malaria*

*Take the person to nearby health facility*

*Why are you eaten by malaria while knowing this fact?*

*Completing the drugs given by the health provider is must*

*Leaving the drugs unfinished is our fault*

*The drugs completely taken, then malaria disappears from our body."*

A grade 8 male student of 17 from Nono-Benja wrote:

*"...When we see symptoms of malaria,*

*Visiting health facility within 24 hours*

*Following the health professional's advice correctly*

*Taking the drugs as prescribed by the health professional*

*Refraining ourselves from giving the drugs to someone else,*

*We can be saved from malaria."*

## **Thematic message 5:**

Calls to adopt the control practices, and social and behavior changes

Closely linked to knowledge contents mentioned earlier, there were direct calls across the poems to adopt malaria control measures. These calls were to the practices of cleaning surrounding environment, ITNs use, caring IRS, seeking treatment for symptoms, and appropriate drug-use. Interestingly, there were contents that called to social change and collective engagement in eliminating malaria from their community and beyond.

### **Clean the surrounding environment:**

across the poems the central messages left to community regarding malaria via the act of cleaning environment were multiple and fundamental. In the first place, the poems conveyed to community to have an internal locus of controlling malaria in that they can manage the breeding and attack by mosquitoes. A student of grade 6 from Botor-Tolay said:

*"...We do not give place to malaria*

*Let's clean up our environment*

*Let's remove mosquito's breeding site*

*So that put our enemy under the control."*

Secondly, to achieve the control over malaria, the community should manage small water bodies/swampy or conditions that are suitable for mosquito breeding. An 8<sup>th</sup> grader from Limmu-Kossa indicated:

*..Qodaa caccabelle boollatti awwaalamaa*

*Balfi garaagaraas diidatti gubamaa*

*Bishaan ciises yaa'ee gadhiifamaa*

*Lafa margaa kessatti baay'inaan argamaa*

*Lafti margaalle qe'rraa haamamaa*

*Naannoo jirenya keenyaa yero yeroon ilaalla.*" These lines appeal the community to dispose broken materials in pit, burn solid wastes, cut grasses, release any accumulated and irrelevant waters, and make these entire things regularly.

Take precautionary measures for IRS: In support of efforts to kill mosquitoes and control malaria, there were messages in the poems that commanded the community to adopt regarding IRS. One is precautionary measures following the spray, including proper ventilating and not painting the walls within 6 months of spray. A male student of grade 6 from Shebe-Sombo said:

*"...Anti-malarial chemical spray is the third method*

*Let's get out of home while spraying.*

*We will not get back home up until two hours*

*Never open the doors within 15 minutes of spray..."*

Another student of grade 8 from Nono-Benja stressed,

*"..When anti-mosquito chemical is sprayed,*

*Refrain yourself from painting and posting*

*Never paint and mold the wall with mud*

*Follow this command up until 6 months*

*The spray has anti-mosquito chemicals.*

*The sprayed drugs works up to 6 months,*

*You know that no painting or posting the walls*

*That is impossible, strictly forbidden."*

Utilization of ITN: the poems called the exposed community to utilize ITN. The students basically defined the practice of sleeping under ITN as an important weapon to fight malaria. They advised ITN use should become a normal part of daily actions: adapted by everybody at every night, all seasons, and never missed whenever owned. Moreover, the students urged for giving priority to pregnant women and children. Illustration captured by a grade 5 student from Limmu-Kossa said,

*"...Let's use bed net at every night*

*Tie it carefully up when we are awake.*

*Why do we damage it? Rather we care for it*

*We use it as it keeps our health*

*We eliminate malaria by using it.*

*We use it always and stay healthy*

*When not enough for all, play your obligation*

*Give priority for infants and pregnant women."*

In the poems ITN was also presented as precious material to care for through regular washing, drying under the shade, stitching when torn, and never used for unintended purposes like rope, sacks, and wraps. Interestingly, the students also depicted their educational and supportive roles in the act of caring for ITN. A grade 7 male student from Non-Benja stated,

*"...Get up, arise, the educated children*

*It is your turn to teach your community*

*Tell them to sleep under the bed net*

*Not just sleeping under it, they should also care for it*

*We should observe the nets and follow it every day*

*We search it out and stitch whenever we see torn*

*Never forget to tie-up and suspend after using it.*

*It must also wash at every three-month*

*We use soap for wash and shade for drying."*

## **Seek treatment and drug-use for malaria:**

by their poetic skills the students encouraged their audiences to seek treatment for malaria when distinguishable signs are present. Through previous quotations, two main messages were inherent in the poems regarding treatment: malaria should be treated at nearest health facility, and the treatment should be made early i.e. within 24 hours of onset of symptoms. Regarding drugs, given the malpractices presiding in the community, the poems urged the community to complete taking drugs as prescribed by the professionals. A grade 5 female student from Shebe-Sombo said in a local language,

*"...Yoo fuudhannee fixne maaluma nuu gooti*

*Abbaan ofitti dhukkuba taanaan dhukkubni maal gooti*

*Siluma abbaan ofi dhukkubaaf dawaa ofiti*

*Qoricha mana yaalaa nama keennameeni*

*Fayyadamani osoo hin hanbisin*

*Hidda ishee ni kuuttu fayyaa ofi eegnani.*" This stanza literally indicated that it is possible to total control malaria by taking care of ourselves, particularly by adhering to drugs as prescribed by health workers. One key note the poet underscored was that it not a disease that matters rather it is reluctance people have in observing the necessary healthcare.

## **Social and behavior changes towards malar elimination:**

there were interesting messages in the poems that called the entire community and stakeholders to eliminate malaria through collective efforts and engagement. Several principles that defined the social change towards malaria elimination were inherent in the poems: have sense of ownership of elimination tasks (e.g.: cleaning environment and management of mosquitoes), feel responsible (e.g.: considering oneself as having role in the task), social cohesion (e.g.: building networks and keep unity to accomplish pertinent practices mentioned earlier), and collective efficacy and engagement (e.g.: acting together and involvement of all segments). A grade 8 male of 17 from Gera said the following,

*"We will eliminate malaria by working together and keeping unity*

*We will educate our community and take care of our acquaintances*

*Parents and children all contribute for elimination of malaria.*

*We will start working elimination as of this year*

*So that it won't kill us again like any time ever before*

*We will not pass malaria unto the next generation*

*We will eliminate malaria by working hand in hand*

*Let teachers eliminate malaria so that the community develops*

*Let you teach and consult our farmers*

*Let's do what we can do and work with health providers*

*Accept their advice and observe what they say.*

*"Let's get up in groups and individuals to eliminate it from our country."*

Another grade 5 student from Gera district wrote:

*"...Let's get up and make a campaign*

*To remove malaria from the country*

*Rise up, especially the educated students*

*Let's start teaching from the uneducated student*

*Let's go to our people to eliminate malaria*

*We drain stagnant waters by working together*

*Rise and stop it by standing in unity*

*Be strong everyone, and protect yourself"*

Another grade 8 male student from Bator-Tolay wrote:

*"... Rise up to eliminate malaria*

*Strengthen yourself and fasten your belt*

*Remove the ways of spread of the disease*

*Be united as working alone will make you tired*

*As old saying goes bonded strings will tie an elephant (read 2X)"*

## **Metaphors, similes, and personifications promoted malaria preventive practices**

It is not uncommon for poets to use figurative languages. Details of the figurative speeches presented in separate article. The current report was limited to few examples of metaphors, simile, and personifications.

### **Metaphors:**

Metaphors were defined as expressions that were used by directly representing perceptions and practices about malaria according to mental models (symbols, objects, situations, etc.) of the local community.

War and deaths were symbolic representations used to indicate the need to engage in the fight of malaria and its prognosis if the fight is handled reluctantly. A grade 7 student from Nono-Benja said,

*"...It is not as some people think malaria is mild*

*It kills if you don't go to health facility*

*Let's get up for the fight don't be lost in the battle*

*Oh, people of Jimma rise for the solution*

*Defeat the war against malaria.*

*Why are we beaten while we can win it?"*

The death itself was expressed as "being consumed or eaten" i.e. to imply that deaths from malaria are premature and preventable, and should be modified through social and behavior changes. An 8<sup>th</sup> grader female student from Gera expressed,

*"..Malaria wants to take the lives of many people*

*Just like yesterday when it consumed the lives of my people..."*

In the poems ITN was represented by a trap i.e. a mental picture the students used to draw the attention of their audience; rural people use 'trap' for hunting animals e.g.: pigs, monkeys, etc. that damage their farming. This indicated the need to actively use ITN to trap mosquitoes. As when the poorly maintained traps loss to catch animals that damage farming, improper use of ITN make us loss the game over malaria. The mosquito is sketched as life stealing thief. A grade 6 male student from Botor-Tolay said,

*"I will tie a trap and spend the night under it,*

*Where do you get me? Why do you try to bite me?*

*If you hang the trap, mosquito don't bite you anymore*

*So, my people don't joke regarding bed net,*

*Utilize it properly, don't pierce and discard it*

*Hanging the trap on our bed, we will capture and trouble it*

*Finally it will cry anxiously and left in there..."*

A grade 5 female student, from Shebe-Sombo represented mosquito as a life stealing thief:

*"...We know that malaria has many lives*

*Why do we forget caring our life?*

*The Creator wants us to protect ourselves*

*Why do not we use the bed nets?*

*So that a thief will not enter the house*

*Through the door that we have opened (read 2X)."*

Similes: The similes are close to metaphors, but liken malaria perception and practices to something else instead of direct representations. Similes were mainly used to express distinguishable signs/symptoms. For example, fever was expressed like sunny hot day, and chills in terms rainy season weather. A grade 5 student from Limmu-Kossa said,

*"...It makes me hot like the sun burning sun in daytime*

*It also makes me to shiver like rainy season..."*

## **Personifications:**

Personifications were mainly assigned to malaria and mosquitoes. The mosquitoes acts of biting and causing disease assumed characters of people who do evil things while looking good in wiles (e.g.: some people attack others while laughing at them). A grade 6 male student from *Botor-Tolay* said,

*"... This mosquito has a lot of threatening activities*

*It has sharp mouth to feed on human blood.*

*It moves from person to person looking a normal man.*

*It hurts a lot though it looks harmless when it comes to you."*

Another grade 6 male of 15 from Gera expressed:

*"Biting is caused by female mosquito.*

*It carried poison and attacked the community*

*It doesn't fear God, while harming people*

*It works very hard to replicate itself"*

Another grade 8, female student from *Botor – Tolay* personified malaria as:

*"...We have been suffered from malaria*

*It builds a house and reproduced in our body*

*...It finally eats everyone it caught."*

Quantifying the message contents of the poems

Table 2 presents details of frequency of occurrences for thematic and categories of message contents across the poems. To assess the intensity of the underlying messages and the extent to which they were conveyed, the previously narrated contents were quantified in frequency table using total counts of 602 codes as denominator. Message about severity of malaria (101=16.8%), distinguishable signs and symptoms (66=11%), calls to practice of malaria prevention and elimination (63=10.5%), and effectiveness of ITN use (49=8.1%) were the commonest conveyed contents, respectively. Given hidden meanings of figurative speeches considered in separate article, the details of counts were not exhaustively presented in the current report. Nonetheless, count analysis of occurrence limited to three selected speeches indicated 27 out of 52 (51.9%) metaphors, 18 (34.6%) personifications, and 7 (13.5%) similes.

Table 2

Occurrences of thematic and categories of malaria message contents, in twenty students' poems Jimma zone, Oromia, Ethiopia, March, 2020.

Key malaria messages and categories	Counts (%)
Thematic message 1: Knowledge about malaria	216(36.0)
Signs and symptoms	66 (11.0)
Ways of prevention and control	59 (9.8)
Causations and mode of transmission of malaria	51 (8.5)
Caring for nets	17 (2.8)
Mosquito breeding behavior	13 (2.2)
Mosquito biting behavior	10 (1.7)
Thematic message 2: Calls to adopt practices, and changes	161 (26.8)
Social changes towards malaria elimination	63 (10.5)
Clean the surrounding environment	42 (7.0)
Utilization of ITN	23 (3.8)
Take precautionary measures for IRS	18 (3.0)
Seek treatment and drug-use for malaria	15 (2.5)
Thematic message 3: Threat perceptions from malaria	123 (20.0)
Perceived severity	101 (16.8)
Risk conditions	15 (2.5)
Perceived risk or vulnerability	7 (1.1)
Thematic message 4: Perceived effectiveness of measures	76 (13.5)
Insecticide treated nets/nets (ITNs)	49 (8.1)
Cleaning surrounding	12 (2.0)
Use of drugs	6 (1.0)
Treatment of malaria or suggestive symptoms:	5 (0.8)
Indoor residual spray (IRS)	4 (0.7)
Thematic message 5: Misconceptions, beliefs, and malpractices	26 (4.3)
Preventive and treatment malpractices	23 (3.8)
Misconceptions about causes	3 (0.5)

\*Counts of figurative speeches were excluded from the total, and independently reported in text.

## Discussion

The current qualitative study explored the message contents conveyed in malaria poems generated by students in primary schools targeted by one of school-based malaria SBCC project in Jimma zone, Oromia-the largest state in Ethiopia. The conventional and summative content analysis revealed five central themes of message contents. Knowledge about malaria, risk and threat, Misconceptions and malpractices, effectiveness of preventive methods, and calls to adaptations of practices were the dominant ones. Metaphoric expressions and personifications were the commonest forms of literatures used in the poems.

Causations and mode of transmission of malaria was one of the main contents raised across the poems. Knowledge of correct cause of malaria i.e. the parasite plasmodium transmitted through the bite of female anopheles mosquitoes was the commonly introduced content of the poems. Fever, chills, and headache were the commonest signs mentioned by the poems. ITNs and environmental cleaning were the main message contents transmitted towards increased knowledge of preventive actions. Myriads of malaria studies and behavior change oriented programs emphasized similar knowledge contents (39–41). Moreover, it is important to know the correct causation and prevention of malaria to enhance adaption of preventive and treatment actions (42, 43).

The poems picked up misconceptions, beliefs, and malpractices presiding in the community. The dominant misconceptions were related to causes of malaria. Some of the lists include food shortages, hungry, dirty foods, foods items like sugarcane or maize, etc. Numerous studies reported similar misconceptions about causes (44, 45). There were malpractices in community regarding malaria mainly focused on preventive actions. These include miss use of ITN, and sharing and interruption of drugs, similarly, pieces of studies revealed such acts are rampant in Africa (46–48).

Students in primary schools transmitted messages that enhance community appraisals of the threats from malaria. Some studies in Ethiopia indicated the incidence and perception of risk to malaria are significantly falling (4, 22, 49, 50). In spite of falling trend, the poems presented about the need to feel risk and severity of malaria. Particularly, this study revealed that severity of malaria was the most dominant content presented across the poems accounting to 101 (16.8%) of the entire specific messages. Premature deaths and wars were some of the metaphors used to initiate the feeling of risk and engage on practices.

Perceived effectiveness of preventive measures was one of the content in this study which includes bed net, environmental modification, and spraying chemicals. Specifically effectiveness of sleeping under bed was mostly included. This implies that perception of the people about effectiveness of ITN utilization is high. So, finally the utilization of ITN to prevent bite of anopheles mosquito as well as malaria will be

increased. But in this study message of vulnerability of malaria was very low, as a result peoples may be slightly motivated to act. So, it is important to design messages that increases perception of community members remains susceptible to malaria. According to EPPM model, people who feel that using preventive measures is easy and effective but feel little fear about risk of the diseases, message should be design that increase the perception that community members remain susceptible to the diseases (51–53).

Calls to adapt malaria preventive and control practices by community and social changes were one of the major contents of the poems. Cleaning surrounding environments to destroy mosquito breeding sites (draining stagnant water and swampy, removing broken materials, and cutting grasses and leaves of some plants) was a leading call. Use of chemicals i.e. IRS was mentioned in the poems with precautionary (remove household utensils, ventilate houses, no plastering or painting walls until six months of spray, etc.) measures. The second most common call was sleeping under ITN by everyone at every night and season. Global strategies specify habitat modifications, ITN, and IRS as core physical and chemical mosquito control mechanisms (3, 5, 10, 39, 40). Though they were not dominant ones, seeking treatment for malaria symptoms and use completing drugs prescribed by health professionals were convey by the poems. Likewise, ENMP indicates symptoms of malaria should be treated by appropriate drugs after confirmed testing, with 100% adherence to prescriptions within 24 hours of onset of fever (3, 39). Fascinatingly, beyond calls to individual or household behavior changes, the poems sketched social changes for malaria control and elimination. The students raised critical values like sense of ownership, feeling responsibility, social cohesions, and collective engagement to eliminate malaria. Similarly, health communication interventions emphasize on two forms (behavior and social) of change. The social changes are marked by indicators like community participation, engagement of local leaderships and networks, social cohesions, sense of ownership, sharing and feeling of responsibilities, etc.(6, 13, 54)

Obviously, poems are known in artistic literature contents i.e. figurative speeches. There are numerous types of figurative languages to convey messages in any artistic communication: some of them are metaphors, similes, personifications, hyperbole, litotes, irony, paradox, synecdoche, pun, etc (26, 27, 31). The investigators presented the details of the literature contents of the poems in separate article. Nonetheless, two examples of metaphor (about ITN) and personification (about malaria mosquitoes) are used below. This is to explain how effectively messages can be conveyed in poems, by creating contexts and mental models or heuristics for learning or change. Metaphorically the poems represented ITN by traps that effectively catch harmful causative agents i.e. mosquitoes in this case. Such mental models could easily convince the public particularly in rural settings where traps are used to safeguard farming from animals that damage crops. Thus, audiences of the poems could visualize an active use of ITN as mechanism of putting mosquitoes in trap i.e. to prevent attack. Moreover, in the poems personification was allotted to mosquitoes. Mosquitoes put on characters of some evil doing people who attack while resembling friends in their wiles. This personification can easily elaborate that mosquitoes that lived in community, despised, and looked unto as safe can unexpectedly turn out to be harmful and killing. In doing so, the poems give warning to take care of malaria mosquitoes. Evidences indicate that uses of

local contexts and mental heuristics are effective ways of communicating perceptions, attitudes, and promoting practices (12, 55–57).

Overall the poems generated by students in primary schools were rich in messages that also are promoted by a range of malaria prevention and behavior change programs. For example, most of the contents in the poems were targeted by national strategies, RBM's SBCC indicators, stated in malaria elimination framework, and global technical strategy of 2016-30 (5, 6, 10, 13, 54). To mention some, perceived susceptibility, severity, attitudes, self-efficacy, social norms, and practices related to ITN, IRS, environmental, and treatment are the dominant social and behavior change indicators of these programs. Interestingly, a study indicated that there were behavior changes observed in settings where these poems were developed, particularly in knowledge, ITN usage, and precautions concerning IRS (22). Perhaps the poems had contribution for the changes. Therefore, engaging students in generating poems may provide contexts for change and predict malaria prevention and control actions in this era of elimination.

## **Strength And Limitation Of The Study**

To the best of the investigator's knowledge there was limited similar published works in Ethiopia. Therefore, findings were not well discussed with related literatures. These poems were generated in primary schools following school-based malaria project aimed to advance community knowledge and practices. The contents could have been outputs of the knowledge they got from the project itself. This means students in schools that were not targeted by the project may not produce poems that are rich in malaria message contents in similar manner. Thus, minimal support could be required to engage students in such effective agencies. Undeniably, primary school students were not professional and experienced poets. Content analysis presented in the current document may emphasize on connotative than hidden meanings. Nonetheless, there are still clues that the students' skills can be nurtured, utilized, and promoted.

## **Conclusions**

The poetic content analysis indicated that students in primary schools are considerable sources of dominant social and behavior change oriented malaria messages, particularly in resource-limited rural settings. Involving primary schools and students in public health and malaria programs would be an effective approach in promoting knowledge, risk perceptions, attitude, and practices particularly insecticide treated net use, and treatment of fever. Messages about knowledge of malaria prevention ways, perceived severity, and the practice of ITN use, and cleaning the environment were the commonest in students' poems. Nonetheless, messages about vulnerability and seeking of treatment for fever may still be required in the current context of declining trend in malaria incidence and era of elimination. The uses of poems would be advantageous for creating learning contexts by using local beliefs and mental models for conveying messages in convincing manner and figures of speeches including metaphoric expressions.

## **Abbreviations**

**AIM**, Action and Investment to Defeat Malaria; **GTS**, Global Technical Strategy for malaria; **IRS**, Indoor Residual Spraying; **ITN**, Insecticide-Treated Net; **ENMCP**, Ethiopian National Malaria Control Programme; **SBCC**, Social and Behavioral Change Communication; **PMI**, President's Malaria Initiative; **RBM**, Roll Back Malaria; **WHO**: World Health Organization

## **Declarations**

### **Ethics approval and consent to participate:**

Jimma University, institutional review board approved the study with reference number: IRB 000204/20. Consent to participate is not-applicable for poems reviewed. Oral informed consent to access the poems was sought from school directors.

### **Consent for publication:**

Not-applicable

### **Availability of data and materials:**

All relevant data are within the manuscript and its supporting information files.

### **Competing interests:**

The authors declare that they have no competing interests.

### **Funding:**

Jimma University, Institute of Health

### **Authors' contributions:**

YK, MS, ZB conceived the study. YK, AH, and KG designed study and analyzed the data. YK and AH drafted the manuscript. All authors critically reviewed the manuscript. All authors approved the manuscript version submitted to the journal.

### **Acknowledgments:**

We express our heartfelt thanks to all individuals who participated in the study: data collectors, school administrative officials, and language experts who supported in dealing with poetic literatures.

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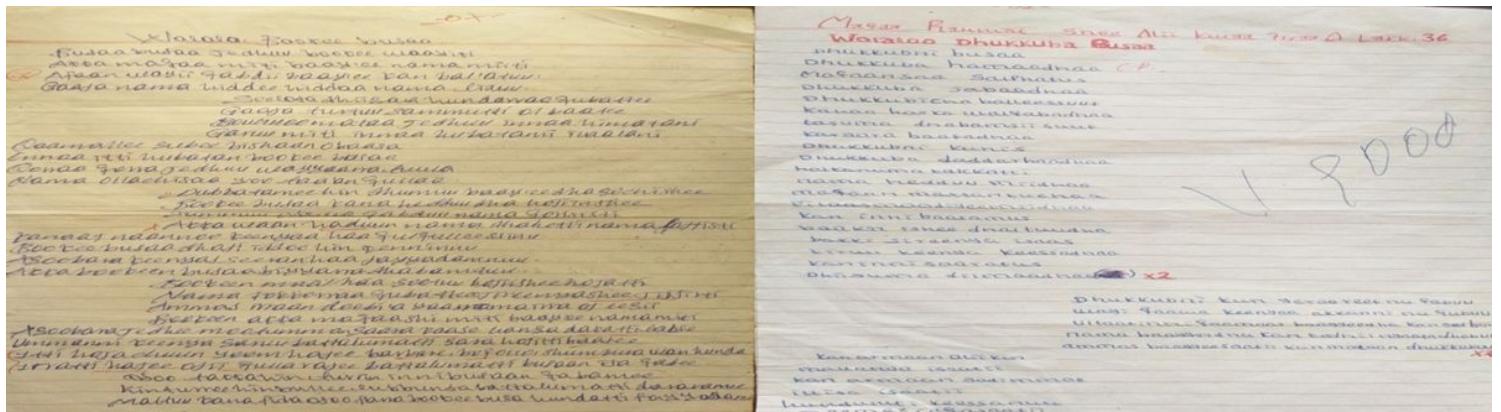
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## Figures



**Figure 1**

Photos of two selected poems, March 2020, Jimma, Ethiopia

## Supplementary Files

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