Community Health Equity Research & Policy
2023, Vol. 0(0) 1–13

DOI: 10.1177/2752535X231184029
journals.sagepub.com/home/qch
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Community-Based Approach to Promote Rational Use of Antibiotics in Indonesia: The Development and Assessment of an Education Program for Cadres

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Abstract

Background: Cadres play an important part in providing community-based education. This study developed and assessed an education program for cadres in Malang, Indonesia, as 'change agents' to promote rational antibiotic use.
Methods: In-depth-interviews with stakeholders ($N = 55$) and a subsequent group discussion with key personnel ($N = 5$) were conducted to develop a relevant education tool for cadres. This was followed with a pilot study with cadres ($N = 40$) to assess the effectiveness and acceptability of the new tool.
Results: Consensus was reached on the education tool media: an audio-recording (containing full information) with a pocketbook (containing key information) as a supplement. A pilot study on the new tool reported its effectiveness in improving knowledge ($p < 0.001$) and demonstrated a high acceptability (all respondents stated 'Strongly Agree' or 'Agree' on all statements).
Conclusion: This study has created a model for an education tool which can potentially be implemented for cadres to educate their communities about antibiotics in the Indonesian context.

Keywords

cadre, antibiotic, education, community-based approach

Introduction

Antibiotics are among the most commonly purchased medications worldwide.[1] The widespread availability of antibiotics including over-the-counter in some pharmacies and in drug stores has been reported in some developing countries, which has contributed to the practice of self-medication. This is defined as the use of medicines to treat self-diagnosed disorders without consulting a medical practitioner and without any medical supervision.[2,3] Based on a systematic review in the Southeast Asia region, the overall prevalence of self-medication with antibiotics was 42.6%[4]; while studies from Indonesia have reported prevalences from 7.3% to 45.0%.[5–7] A recent study of drug outlets in urban (West Java) and rural (South Kalimantan) regions in Indonesia reported a higher percentage (69%) of antibiotic self-medication.[8] Based on the 2013 National Basic Health Study (*Riset Kesehatan Dasar, Riskesdas*), 35.2% Indonesians households stored medications for self-medication purposes; of those, 27.8% stored antibiotics which were mainly obtained without prescriptions.[9] Self-medication of antibiotics has contributed to the risk of inappropriate antibiotic use, and the development of antibiotic-resistant pathogens. This resistance is of global concern, since it is associated with prolonged illnesses, broad spectrum antibiotic management, more doctor visits or hospital admissions, and even deaths.[4]

One key strategy to prevent and control inappropriate use of antibiotics through self-medication is to improve public

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knowledge and awareness.[10] In 2015, the Indonesian Ministry of Health introduced the 'Smart Use of Medications Movement' (*Gerakan Masyarakat Cerdas Menggunakan Obat', GeMa CerMat*), i.e., a national campaign to empower Indonesians in responsible self-medication practice.[11] The initiative has been implemented through Regional Health Offices (*Dinas Kesehatan Kota/Kabupaten*) and Primary Health Centres (PHC; *Pusat Kesehatan Masyarakat*, *Puskesmas*) as the technical units. As part of the initiative, health professionals have been involved to provide community training to improve basic knowledge on medications.[12] Due to overstretched health professional staff in many PHCs,[12] community pharmacists in the area have been involved as trainers. The community training has initially targeted health cadres, i.e., community members who were trained to assist with activities organised by PHCs; they are expected to act as 'change agents' within their local communities, thus educating a broader population.[13,14] In 2016, GeMa CerMat training involving local cadres and pharmacists was piloted in four regions in which significant knowledge was gained among health cadres following the training ($p < 0.001$).[14]

Initially, the education tools/modules developed for GeMa CerMat training consisted of general information on medications (e.g., drug active ingredient – generic vs brand name, indication, drug classifications, directions for use).[14,15] These were later expanded to the development of tools for specific drug classes (such as: analgesics, common-cold drugs) to facilitate a focused learning process among health cadres. A previous study reported that specific education modules have significantly improved health cadres' knowledge compared to the general module.[16] Although there are various educational tools for antibiotics available, most have been developed at the national level (The Ministry of Health). However, Indonesia is a large archipelagic country with a cultural diversity across regions,[17] the implementation of these nationally developed education tools has some limitations at the regional levels. Previous findings have suggested that an education program must be specifically designed to reach a specific target population and should be able to address change in their social norms.[13,18,19]

Malang is the second largest city in East Java Province, Indonesia. Based on limited data available at Malang PHCs, more than 50% of patients did not use their antibiotics correctly (e.g., used leftover antibiotics, not completing antibiotic courses).[20–22] Since 2017, the Malang Regional Health Office has focused a GeMa CerMat initiative on the safe use of antibiotics. They initiative initially targeted health cadres as 'change agents' in their local communities. While a preliminary study in Malang reported health cadres ($n = 112$) had relatively supportive attitudes in the responsible use of antibiotics, they had a lack of knowledge on some important aspects of antibiotics, such as indication and resistance.[23] This indicated the importance of a relevant education program to optimise the role of Malang health cadres in promoting responsible use of antibiotics. This study aimed to develop an antibiotic education tool for health cadres in Malang, Indonesia as well as to pilot the effectiveness and acceptability of the developed tool.

Methods

This study was conducted in Malang City, East Java, Indonesia, with a population of 866,118 in 2018.[21] Malang comprises five districts (*kecamatan*): Kedungkandang, Sukun, Klojen, Blimbing, and Lowokwaru; with 16 Primary Health Centres (PHCs) spread throughout the districts.[24] This study was conducted in accordance with the Declaration of Helsinki, and obtained permission from Malang Regional Health Office as well as ethics approval from the Research Ethics Committee at Universitas Surabaya (number: 082/KE/VII/2019). All participants in this study gave their informed consent for inclusion before participation. Unique identifiers were used to protect participants' privacy and personal information, and the data files were protected using a password which can be accessed only by the primary researchers. The study comprised of two stages, i.e., development of the education tool, then followed by evaluation of the tool by health cadres (a pilot study).

Stage 1: Development of the Education Tool

In-depth Interviews With Stakeholders

In-depth interviews were conducted with a wide range of stakeholders to identify the relevant antibiotic educational tools acceptable for health cadres in Malang. The stakeholders were purposefully selected to include: (1) representatives from the Regional Health Office and PHCs ($n = 35$), i.e., three staff from the Community Empowerment Division at the Regional Health Office and 32 PHC staff (two staff was selected from each PHC by the heads of PHC); and (2) health cadres ($n = 16$), i.e., one cadre was selected as a representative for each PHC. While there are no cadre lists in each PHC, the cadre representatives were selected by the heads of PHCs or PHC pharmacists or health promotion staff based on the cadres' active involvement in the PHC's community activities within the last year (which indicated that they have current interests and ability to provide future community education).

The interviews were conducted in person using Bahasa Indonesia by one of the researchers (JC) between July and August 2020. JC invited selected stakeholders for interviews via telephone and explained the nature of the study. If the stakeholders expressed their willingness to be further involved, face-to-face interviews were scheduled at a mutually-agreed upon time and place. Prior to the interview, they were asked to complete an informed consent and demographic data form. The interviews were aided by a semi-structured interview guide to explore two key topics: (1) antibiotic education tools currently available, and (2) proposed content and

media which are relevant for an antibiotic education tool. Findings from a previous survey on Malang health cadres' knowledge about antibiotics were used as a guide for the interview questions regarding the content.[23] The interview guide was face-validated by five cadres to ensure the questions were understood (not misinterpreted). The interviews were conducted on all selected stakeholders, lasted around 30–60 min each, and were tape-recorded. Saturation was attained after the 20th interview. The data was considered saturated when the researchers did not encounter new information or themes relating to the research topic.[25]

Quantitative data related to the stakeholders' demographics were analysed descriptively, while audio recordings from the in-depth interviews were transcribed verbatim. The transcripts were then reviewed using inductive thematic analysis to identify salient themes.[26] The data analysis first involved a process of familiarisation; significant statements related to current and proposed educational tools were subsequently identified and coded. The codes were categorised into a broader conceptual level (i.e., into themes). The process of theme generation was reviewed and refined by going back and forth between the themes, the codes, and the transcripts until the final themes were identified. The data analysis was performed by JC, and the final themes were discussed with other research members who had read the transcripts (AP, ES, YIW) to reach an agreement. JC was master-of-pharmacy candidate with a training in conducting interviews and a staff member in the Malang Regional Health Office; while AP, ES, YIW were pharmacy academics (PhD in Pharmacy) and had experience in qualitative research. To improve accuracy, the final themes were provided to the participating respondents as a means of member checking.[27]

A Focus Group Discussion With Key Personnel

A focus group discussion was conducted with five key persons in September 2020, to select the most relevant antibiotic education tool which had emerged from the stakeholder interviews. The key persons were selected by the Head of Malang Regional Health Office, including one expert in public health, one expert in pharmacy practice, one expert in infectious diseases, one representative of Malang Regional Health Office (i.e., the decision maker), and one pharmacist from Malang Regional Health Office (i.e., the trainer). The key persons were invited for an online group discussion in October 2020; the discussion was assisted by one moderator (AP) and one note-taker (SV). A guide was used to assist the discussion which consisted of three stages. First, one of the researchers (JC) presented the content and media themes for education tools obtained from the stakeholder interviews. Second, each key person was asked to comment and select the most relevant media and content for an education tool. Third, all key persons reached a consensus by discussion to select the education tool to be developed. The discussion was audiotaped and lasted about 2 h. The audio-recorded data were transcribed verbatim and inductively analysed (JC) using thematic analysis.[26] All qualitative data analysis was conducted in Bahasa Indonesia, while the theme labels and the illustrative verbatim quotes were translated into English by YIW. These studies enabled triangulation of findings to be undertaken.

Stage 2: Evaluation of the Education Tool by Cadres (A Pilot Study)

Based on the consensus reached in Stage 1, an antibiotic educational tool was drafted by the research team and designed by a specialist. It was then piloted to 40 health cadres from 16 PHCs throughout Malang where two or three health cadres were selected from each PHC. While official lists of cadres per PHC were not made available, cadres were purposively selected by the PHC's head or pharmacist or health promotion staff, taking into account their active involvement in the related PHC's activities. Previous literature suggested a sample size of 10 or 20 can be considered adequate for a pilot study.[28,29]

Effectiveness

A pre-/post-test was used to evaluate the effectiveness of the developed educational tool, i.e., the knowledge difference among health cadres before and after learning with the tool. The test was generated from that used in a previous study, which consisted of 20 true/false statements (20); some modifications were applied according to the tool consensus in Stage 1. The modified test was tested in 10 cadres, and Cronbach's alpha test was used to analyse the reliability or internal consistency (a value of ≥0.6 would be considered acceptable).[25]

The selected cadres were contacted via telephone; the researchers explained the study and asked for their participation. Of those who agreed to participate, face-to-face meetings were subsequently scheduled at a mutually agreed time. At the beginning of the meeting, the cadre was asked to complete an informed consent and a questionnaire about demographic data. Then, the pre-test was conducted and followed with the post-test after learning using the developed tool.

Descriptive analysis was used to summarise the demographic data. For each of the 20 statements in the pre-test/post-test, a score of "1" was given for a correct answer, while a score of "0" was given for an incorrect or "don't know" answers; a maximum total score of 20 per respondent was expected. A mean total score was then calculated from all respondents for pre-test as well as post-test. The difference between pre-/post-test total score means was tested using

paired-sample *t* test (or Mann-Whitney test if the data was not normally distributed).

Acceptability

After the post-test, the cadres were also asked to complete a questionnaire to assess the acceptability of the developed tool. The questionnaire was generated based on the educational material acceptability (EMA) questionnaire, which comprised of four domains: (1) clarity and content; (2) reading level; (3) accuracy; and (4) technical quality;[28] this was modified according to the tool consensus in Stage 1. The modified questionnaire was face-validated with 10 cadres to ensure that the questions were correctly interpreted, while reliability (internal consistency) was tested using Cronbach's alpha.

For each statement on the modified EMA questionnaire, the cadres were asked to respond using a five-point Likert Scale (i.e., SD – strongly disagree, D – disagree, N – neutral, A – agree, SA – strongly agree). Frequencies and percentages of respondents who provided the answers (SD, D, *N*, A, and SA) for each statement were calculated. Data was analysed with using Statistical Package for the Social Science (SPSS) software version 24.

Results

Stage 1: A Qualitative Approach to Develop the Educational Tool

A total of 55 stakeholders were interviewed, with an additional four respondents (i.e., three additional respondents from the 35 PHC/Regional Health Office representatives initially planned, and one additional respondent from the 16 health cadres initially planned). This addition occurred because four initial respondents did not response to the invitations, hence four other respondents were selected as replacements; later the initial four respondents informed their willingness to participate. Details on the range of respondents were presented in Table 1.

Interviews with stakeholders indicated that no education tools specifically developed for antibiotics was available for health cadres in Malang. Currently, education tools on basic information about medications (not specific to antibiotics) are used in Malang which can be categorised into four types of media: visual, audio, audio-visual, and other media (Table 2).

One of the chosen visual media was printed material. Printed material in small handy size (e.g., leaflet, pocketbook) was chosen as it is easily distributed and highly portable where cadres can read or use it anywhere anytime; as stated by SD2 (health promotion staff – Regional Health Office): "*If it is going to be used by health cadres, a simple (printed media) will be better, because it can be carried around anywhere – the cadre is not (visiting) only one, right, maybe they visit many… (they can go to) several places. If it is simple, (health cadres) can explain it easily. Also, they can bring it anywhere; it can be used as a pocketbook for them.*" As for bigger printed material, such as poster, should be placed in strategic locations with eye-catching designs to capture moving audiences.

Another visual media preferred was the use of activities/objects to bring real experiences, including interactive games or realia (i.e., an object or model). These media were considered to provide a more active learning environment compared to the printed material. They might keep the participants engaged, interested, and eager to learn, thus improving their understanding as well as retention. This media was also believed to be suitable for participants of any age, as stated by AP18 (PHC pharmacist): *"I saw that the community members showed more interest in monopoly, because the monopoly (game) can be used by all ages, Ma'am."* While PowerPoint presentation (PPT) could be a media of choice for a bigger group of participants, as stated by AP1 (PHC pharmacist): *"If (using) PPT, it can be seen by (all) people in the room, right."* However, the use of PPT requires special equipment, such as laptops and projectors, which may not be readily available at certain training facilities.

In addition to visual media, audio media could be an option for groups with reading and writing difficulties. Further, mobile audio broadcasts can reach cadres in remote areas, as expressed by KP4 (health cadre): *"The one which is frequently used for health promotion; it's (a mobile audio broadcast which is) going around (kampongs/villages). The most popular is like '*miekesling*' (i.e., health promotion staff is going around in special vehicles to deliver education with loudspeaker) – that's it, audio"*; while jingles seemed to be memorable but provided a limited information. Further, some participants perceived audio-visual media (i.e., video) to be more interactive than visual or audio media, thus improving learning, motivation and understanding among cadres. A video can be shared via smartphones, hence improving the accessibility; as stated by KP3 (health cadre): *"For me, the first (preference) would be YouTube (video); it can be turned on and played anywhere, that's my first option."* When adequate IT support is available, mobile application development can be considered, as it can facilitate continuous engagement with users/cadres to assist them providing community education.

All the suggested educational tools from the stakeholders were then brought to a focus group discussion with the five key persons. Each chose the media and content for education tools that they considered to be the most suitable and feasible for implementation (Table 3). Auditory (i.e., audio recording) or audio-visual (i.e., video) media were considered to be the most relevant for implementation, especially during the Covid-19 pandemic, as explained by HO (Malang Regional Health Office representative, the decision maker): *"During the pandemic, with restrictions on meetings and strict protocols, PPT and flipcharts are not the best option – video*

Table 1. Respondents' Demographic Characteristics.

Characteristics	*n*	(%)
Regional health office/PHC representatives (*N* = 38)		
Gender		
Female	31	81.6
Male	7	18.4
Age [mean±SD (range), years]	38.0±10.0 (23–59)	
Educational level		
Diploma (i.e., pharmacy, environmental health)	4	
Bachelor (i.e., public health, environmental health, nutrition)	8	
Profession		
- Physician	9	23.7
- Pharmacist	16	42.1
Postgraduate (master or doctoral degree)	1	2.6
Position		
Regional health office staff	3	7.9
Head of PHC	16	26.3
PHC Health promotion staff	7	18.4
PHC Pharmacist/pharmacy technician	18	47.4
Health cadres (*N* = 17)		
Gender		
Female	17	100
Male	0	0
Age [mean±SD (range), years]	52.4±7.2 (37–62)	
Highest education level		
No school	0	0.0
Elementary school/equivalent	0	0.0
Junior high school/equivalent	3	17.6
Senior high school/equivalent	9	52.9
Diploma	2	11.8
Bachelor	3	17.6
Health education background		
Yes	0	0
No	17	100
Employment status		
Not working	11	64.7
Working	6	35.3
Had experience in providing antibiotic education		
Yes	8	47.1
No	9	52.9
Had completed training related to antibiotics		
Yes	8	47.1
No	9	52.9

Abbreviations: SD, standard deviation.

media would be the most feasible"; or by PH (expert in public health): "*The most feasible (audio recordings). If it is impossible to meet during the pandemic, (we) need to anticipate – as (we) don't know when the pandemic will come to an end."*

Nevertheless, there are some doubts on the use of video because of several obstacles, as expressed by IC (expert in infectious diseases): *"Much higher (internet) quota would be needed to watch a video, and not all cadres have smartphones. So that, (it is better to) give an audio recording – it can be shared* via *mobile phones or other gadgets, or (we can) give it in the USB"*; or by PP (expert in pharmacy practice): *"Video could be more interesting, but (the need for) technical support, such as adequate (internet) quota and gadget specification, can be a problem in this context. Audio recording would be more practical and come with a lower cost."* From the discussion, the five key persons reached a consensus that the most relevant educational tool to

Table 2. Proposed Media and Content for Antibiotic Educational Tools From Interviews With Stakeholders.

Media	Content
A. VISUAL MEDIA	**A. What are antibiotics?**
Printed material	• Definition
Flyer/leaflet/brochure	• When to use – only indicated for bacterial infection, some symptoms do not require antibiotics
Pocketbook	• Types/classes
Poster	• Dosage forms – e.g., dry syrup, tablet/capsule
Flip chart	• Prescription only medicines – only use antibiotics based on the doctor's prescription, do not purchase antibiotics without a prescription or using an old prescription, do not share antibiotics to others
Activities or objects used to bring real experiences	• The difference between antibiotics with other drug classes
Interactive games	**B. About antibiotic resistance**
Realia [e.g., dummy drug, emotional demonstration (Emo-Demo)]	• Definition
PowerPoint presentation (PPT)	• Causes
B. AUDIO-VISUAL MEDIA (e.g., video)	**C. Rational use of antibiotics**
C. AUDIO MEDIA [e.g., mobile audio broadcast – '*media informasi kesehatan keliling' (MIEKESLING),* jingles]	• Directions for use – take according to the doctor' directions, take at the specified time intervals, finish all the prescribed antibiotics, duration
D. OTHERS	• Awareness toward side effects
Mobile application	• Storage and expired date

be developed is audio-recording. Additionally, they agreed to include handy printed materials, i.e., a pocketbook containing key information (presented as pictures and short explanatory text) as a supplement to help cadres recall the full information from the audio recording. The audio-recording can be shared through mobile phone (using social media platforms, such as WhatsApp®) or USB.

Regarding the content, the themes suggested by the stakeholders were generally viewed by the key persons as adequate – this was three basic items: (1) what are antibiotics, (2) antibiotic resistance, and (3) rational use of antibiotics (Tables 2 and 3). However, some modifications were applied, including: (1) adding information about interactions, as expressed by IC (expert in infectious diseases): *"It should include information regarding interactions with foods and other medications (in the 'rational use of antibiotics' section) – just an overview, so that they can be aware (of it)."*; and (2) omitting the difference between antibiotics and other drug classes, as stated by PH (expert in public health): *"I think the difference between antibiotics and other drug classes is not necessary. It is enough to stress that antibiotics are for bacterial infections (in the 'what are antibiotics' section)*." Further, as the content was considered lengthy, the key persons suggested to deliver it on several occasions (e.g., three occasions – one item of information per occasion); this way, it would be easier for health cadres to adjust with their schedules. In addition, it was suggested that the outcomes of the education program with the new tool should be properly assessed – not only looking at the effect on knowledge but also on behaviours in using antibiotics.

Stage 2: The Pilot Study

The effectiveness of the developed educational tool was tested using a modified pre-/post-test which consisted of three domains (in accordance with three basic information areas in the tool), including: (i) what are antibiotics (statements 1–6), (ii) about antibiotic resistance (statements 15–17), and (iii) rational use of antibiotics (statements 7 to 14, and 18–20). A Cronbach's alpha value of 0.78 was obtained, hence the reliability of the modified test was considered acceptable.

Further, the pilot study involving 40 cadres, who were all women with a broad age range (28–63 years), showed significant increased knowledge (mean total score pre-test vs post-test: 10.90 vs16.93, respectively; $p < 0.001$) (Tables 4 and 5). Related to 'what are antibiotics' domain, less than 50% of the cadres provided correct answers in the pre-test for the following statements: 'Antibiotics can treat all infections (F)', 'Recovery from influenza would be sooner with the use of antibiotics (F)', and 'Antibiotics can be purchased without a doctor's prescription (F)'; this was improved in the post-test where approximately 80% provided correct answers for all items. Further, less than 50% of the cadres provided correct answers for all items in the 'about antibiotic resistance' domain during pre-test; while the post-test showed an increase to >80% for most items (except: 'Humans can develop immunity towards antibiotics (F)'). Better pre-test results were reported for 'rational use of antibiotics' domain where more than 50% indicated correct responses for most items (except: 'Antibiotics must be stopped immediately if new symptoms appear, such as skin redness or rash (T)'); this was improved to >80% for most items during post-test (except:

Table 3. The Group Consensus on the Most Suitable Media and Content for the Antibiotic Education Tool.

Participant code	Media (themes)	Content (themes)
HO (Malang regional health Office representative, the decision maker)	Audio-visual (video) + printed material	What are antibiotics? Rational use of antibiotics
IC (infectious disease expert)	Audio-recording + pocketbook	What are antibiotics? Rational use of antibiotics – recommend adding about interactions About antibiotic resistance
PH (Public health expert)	Audio-recording + pocketbook	What are antibiotics – recommend omitting the difference between antibiotics and other drug classes Rational use of antibiotics
PP (Pharmacy practice expert)	Audio-visual (video)	What are antibiotics? Rational use of antibiotics About antibiotic resistance
Ph1 (Pharmacist, the trainer)	Audio-recording + pocketbook	Rational use of antibiotics
Consensus	Audio-recording – provide full information *plus* Pocketbook – provide key information (presented as pictures and short texts to explain)	• What are antibiotics? (omitting the difference between antibiotics and other drug classes) • About antibiotic resistance • Rational use of antibiotics (adding interactions)

'Antibiotics must be stopped immediately if new symptoms appear, such as skin redness or rash (T)', and 'All antibiotics must be stored in a refrigerator (F)').

In addition to the effectiveness, the acceptability of the developed tool was tested using a modified EMA questionnaire, which comprised of four domains: (1) clarity and content (statements 1, 2, and 3); (2) reading level (statement 4); (3) accuracy (statements 5, 6, and 7); and (4) technical quality (statements 8 and 9). A Cronbach' alpha value of 0.806 was reported for this modified questionnaire, hence it was considered reliable. Further, the results from the pilot study indicated that 100% of the respondents stated 'Strongly Agree' or 'Agree' on all statements pertaining to the four domains of acceptability (Table 6).

Discussion

This is the first comprehensive study using a qualitative approach to develop an education tool for antibiotics in Indonesia. Considering Indonesia's large geographic area where each region has its unique characteristics, qualitative research was particularly relevant; it allowed in-depth understanding to be gained on the local context for use in the design of a product (or for addressing a problem).[25] The outcome was the development and satisfactory testing of a new education tool for community education about antibiotics. This was achieved with a combination of audio-recording and a pocketbook consisting of three basic information themes (i.e., what is antibiotic, about antibiotic resistance, the rational use of antibiotics). Marked levels of

Table 4. Health Cadres' Characteristics (N = 40).

Characteristics	*n*	(%)
Age [mean±SD (range), years]	46.6±9.0 (28.0–63.0)	
Highest education level		
No school	0	0
Elementary school/equivalent	0	0
Junior high school/equivalent	3	7.5
Senior high school/equivalent	27	67.5
Diploma	4	10.0
Bachelor's degree	6	15.0
Master or doctoral degree	0	0
Health education background		
Yes	0	0
No	40	100
Employment status		
Not working (e.g., student/housewife/retiree)	28	70.0
Working	12	30.0
Experience as health cadres		
<1 year	1	2.5
1–2 years	4	10.0
>2 years	35	87.5
Had previous experience in providing antibiotic education		
Yes	5	12.5
No	35	87.5
Had completed training related to antibiotics		
Yes	5	12.5
No	35	87.5

Table 5. Health Cadres' Pre-/Post-Test Results Before and After Using the Developed Tool (*N* = 40)

No.	Statements	Respondents with correct answers	
		Pre-test *n* (%)	Post-test *n* (%)
Domain 1: What are antibiotics			
1	Antibiotics are effective against bacteria (T)	31 (77.5)	40 (100.0)
2	Antibiotics can treat all infections (F)	10 (25.0)	29 (72.5)
3	Recovery of influenza would be sooner with the use of antibiotics (F)	11 (27.5)	36 (90.0)
4	Leftover antibiotics can be stored in the house for future needs (F)	31 (77.5)	40 (100.0)
5	Antibiotics can be legally purchased without a doctor's prescription (F)	14 (35.0)	40 (100.0)
6	Antibiotics can be obtained from relatives or friends without having to see a doctor (F)	27 (67.5)	40 (100.0)
Domain 2: Rational use of antibiotics			
7	I can stop using antibiotics when symptoms have resolved (F)	27 (67.5)	38 (95.0)
8	Antibiotics would work faster when we take double the prescribed dose (F)	29 (72.5)	35 (87.5)
9	We should always follow directions for using antibiotics (T)	39 (97.5)	40 (100.0)
14	All antibiotics can be taken with meals (F)	22 (55.0)	33 (82.5)
18	Antibiotics in the form of dry syrup should be diluted in water prior use (T)	29 (72.5)	37 (92.5)
10	Antibiotics effectiveness can decrease when the full course is not taken (T)	27 (67.5)	32 (80.0)
11	Antibiotics can trigger allergic reactions (T)	23 (57.5)	32 (80.0)
12	Antibiotics do not cause side effects (F)	22 (55.0)	33 (82.5)
13	Antibiotics must be stopped immediately when new symptoms appear, such as redness on the skin (T)	2 (5.0)	10 (25.0)
19	Antibiotics can be degraded even before the expiration date due to improper storage (T)	35 (87.5)	38 (95.0)
20	All antibiotics must be stored in a refrigerator (F)	24 (60.0)	26 (65.0)
Domain 3: About antibiotic resistance			
15	Humans can develop immunity towards antibiotics (F)	5 (12.5)	10 (25.0)
16	Antibiotics resistance means that antibiotics can no longer kill the bacteria (T)	16 (40.0)	33 (82.5)
17	Antibiotic resistance can spread across bacteria (T)	12 (30.0)	39 (97.5)
*Total mean score±SD (possible range 0-20)		10.90 ± 3.10	16.53 ± 1.52
		p-value <0.001	

Abbreviations: T, true; F, false.
*Total score was calculated by adding scores of the 20 statements; for each statement - score "1" was given for the correct answer, and the score "0" was given for wrong or "don't know" answer.

acceptability and effectiveness were evident from the follow-up pilot study with Malang health cadres.

The use of a combination of a visual media (i.e., printed pocketbook – consisting of key information) and audio media (i.e., audio-recording – providing full information) for the new tool is expected to facilitate pertinent antibiotic education for a broader range of health cadres in Malang, with different sociodemographic and educational backgrounds. Based on The Mayer's cognitive theory of multimedia learning (CTML), people process information through auditory and visual channels, and each channel has a limited amount of memory.[30] Hence, the combination of words and pictures should increase an individual's capacity to learn.[31–33] A recent review has suggested that the use of picture-based health material is even more prominent among those with low health literacy.[33] In addition, both pocketbook and audio-recordings can offer access to a wide audience; a pocketbook can be taken home and audio-recording can be easily shared via free social media applications (such as *WhatsApp*) using smartphones with less bandwidth required than for video. Given 63.3% of Indonesians used smartphones in 2019, which was predicted to increase to 89% in 2025,[34] distributing information via social media warrants further consideration. This is particularly relevant during the COVID-19 pandemic where offline meetings involving many people has been restricted.

The content of the developed tool was delivered in three (3) sections; this should offer flexibility for cadres doing self-study, as they can choose how many sections they would like to learn based on their available time. Health education or information that has involved a lot of knowledge can lead to lay people being overwhelmed. Studies have shown that patients remember as little as one-fifth of information given and immediately forget 40%–80% of the content of their medical encounters.[35–37] The encounter length as well as the amount of information given has been known to be associated with the patient's ability to recall.[38,39] One educational strategy used to address this issue is to break down complex information into small learning units in a step-by-step approach.[36] This strategy has often been implemented in health professions education, and has shown positive impacts in maintaining knowledge, learning and reinforcement.[40,41]

Table 6. Health Cadres' Responses on Acceptability Questionnaire After Using the Developed Tool.

No.	Statements	SD *n* (%)	D *n* (%)	N n (%)	A *n* (%)	SA *n* (%)
Clarity and Content						
1	Information from the education tool (audio recording & pocketbook) help me better understand about what are antibiotics	0	0	0	13 (32.5)	27 (67.5)
2	Information from the education tool (audio recording & book) help me better understand about antibiotics resistance	0	0	0	14 (35.0)	26 (65.0)
3	Information from the education tool (audio recording & book) help me better understand about the rational use of antibiotics	0	0	0	14 (35.0)	26 (65.0)
Reading Level						
4	The education tool (audio recording & book) provides clear explanation using easy-to-understand language	0	0	0	18 (45.0)	22 (55.0)
Accuracy						
5	The education tool motivates me to use antibiotics in proper manners	0	0	0	17 (42.5)	23 (57.5)
6	I will use the education tool while delivering antibiotic education to my community	0	0	0	24 (60.0)	16 (40.0)
7	Information from the education tool (audio recording & book) can answer my curiosity regarding antibiotics	0	0	0	21 (52.5)	19 (47.5)
Technical Quality						
8	Specific questions for the pocketbook					
	a. The font is adequate in size and easy to read	0	0	0	23 (57.5)	17 (42.5)
	b. The illustrative picture is interesting and easy to understand	0	0	0	23 (57.5)	17 (42.5)
9	Specific questions for the audio recording					
	a. The recording is easy to access and use	0	0	0	21 (52.5)	19 (47.5)
	b. The audio quality is adequate and clear	0	0	0	19 (47.5)	21 (52.5)

Abbreviation: SD, strongly disagree; D, disagree; *N*, neutral; A, agree; SA, strongly agree.

This approach might be well received by cadres given the demands on their time and cognitive load.

Further, the new tool has been piloted among 40 cadres in Malang, Indonesia, and has shown potential effectiveness in improving antibiotic knowledge. A larger study with multivariate analysis taking into account the differences in cadres' characteristics would be required to confirm this finding. However, the univariate analysis between cadres' characteristics in this pilot study and the pre-test (as the baseline of knowledge) has reported no significant differences (all $p > 0.05$), which might indicate the potential effectiveness of the tool in light of the differences in the cadres' characteristics. All of the cadres involved were females which are comparable to those in prior research in Malang as well as other parts of Indonesia[23]; females cadres are mainly housewives and not working, thus allowing a greater time commitment to be involved in the PHCs' training activities; the lack of males' involvement as cadres could be due to having more responsibility at work, especially in Indonesia where the division of tasks or responsibilities are based on gender.[42,43] While the cadres' characteristics are comparable to the prior study where most cadres were females and high-school graduates;[23] this study should provide an insight on the relevant education tool for the Indonesian contexts.

Some education tools for antibiotics have been developed previously at the national level (Ministry of Health), including printed material (e.g., poster, leaflet, handbook/guidelines on the use of antibiotics) or video; [44]however, evaluation data are still lacking. A few local studies on cadre education programs, mainly through offline seminars or training (with modules) as well as through online material (via *WhatsApp*), have indicated some effectiveness in improving knowledge;[45–47] however, the tools' acceptability among the target population has never been previously evaluated. This present study has involved a thorough process in developing and evaluating a new education tool, which should better address cadres' needs.

The pilot study indicated cadres had low baseline knowledge of antibiotics, particularly related to indication – where most cadres were unaware that antibiotics are indicated for bacterial infections and what conditions are related to the infections – as well as resistance. This is in parallel with findings from a previous study in Malang (n = 112 health cadres) where lack of knowledge regarding "indication" and "resistance" were reported.[23] Other Indonesian studies have reported low levels of antibiotic knowledge among health cadres or community members.[45–47] This pilot study reported the potential of this new tool to improve health cadres' knowledge on antibiotics, including in the area of indication and resistance. In addition to the potential

effectiveness, cadres reported a high acceptability on the tool's clarity and content, reading level, accuracy, and technical quality. It was suggested that if an intervention is considered acceptable, people are more likely to adhere to the program and results in positive outcomes.[48]

There are some limitations to this study. As qualitative data are a product of the views, experiences and perceptions of the respondents, bias can occur if respondents are not sharing their true responses.[25] The interviews were performed one-on-one, thus creating a non-intimidating environment where participants should have been able to express their true ideas/opinions. To improve accuracy, the results of this study were provided to the participating respondents as a means of member checking.[27] This study included a pilot study to evaluate the effectiveness and acceptability of the new tool. This pilot study included a small number of cadres who were purposively selected (non-random) which might expose to selection bias and limited generalisability. In addition, a no control group would limit the ability to ascertain the causal relationship. Cadres in this pilot study, however, were selected to represent all PHC ($n = 16$) in Malang City, which should be able to provide insights on the context of Malang as well as Indonesia.

Conclusion

This study has created a new education tool for cadres to educate their communities about antibiotics. The use of media combination (e.g., an audio and a complimentary short printed material) can be considered to be effective and feasible tool for community education in resource-challenge setting. While this preliminary data has demonstrated the potential implementation of the new tool, a larger study would be required to confirm the effectiveness of the new tool, as well as to evaluate its long-term effects on cadres' behaviours and their impact in their local communities. These findings could also stimulate studies in other countries where there is limited understanding of antibiotics, especially resistance.

Acknowledgements

We would like to thank Malang and East Java Provincial Health Offices – Ministry of Health Republic of Indonesia, and Centre of Medicines Information and Pharmaceutical Care (CMIPC) – Faculty of Pharmacy, Universitas Surabaya, the staff and other community organisations that supported in our planning and hosted the community training.

Author Contributions

JVC: investigation, formal analysis, writing-original draft preparation. APS: funding acquisition, conceptualisation, validation. ES: methodology, formal analysis, data curation. BP: investigation, validation. SVH: investigation, formal analysis, data curation. SAW: investigation, validation. BS: conceptualisation, writing-reviewing and editing. YIW: methodology, formal analysis, validation, writing-reviewing and editing.

Ethical Approval

This study obtained permission from Malang Regional Health Office (number: 072/352/35.73.302/2019) as well as ethics approval from the Research Ethics Committee at Universitas Surabaya (number: 082/KE/VII/2019). The study was conducted in two stages, i.e., development of the education tool, then followed by evaluation of the tool by health cadres (a pilot study).

Informed Consent

Participants were fully informed about the nature of the study, and written informed consents were obtained from those who agreed to participate.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the this study was received a grant from the Ministry of Research, Technology and Higher Education of the Republic of Indonesia through the Master's Thesis Research Grant of 2020 (034/SP-Lit/LPPM01/RistekBRIN/Mono/FF/III/2020).

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Priscilla Reddy, MPH, PhD	Population Health, Health Systems and Innovation (Phhsi), Cape Town, South Africa
Marilyn Rice	Pan American Health Organization, Washington D.C., USA
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Community Health Equity Research & Policy

ISSN: 2752-535X
Online ISSN: 2752-5368

International Quarterly of Community Health Education

COUNTRY

United States

Universities and research institutions in United States

Media Ranking in United States

SUBJECT AREA AND CATEGORY

Medicine
- Medicine (miscellaneous)
- Public Health, Environmental and Occupational Health

Social Sciences
- Education
- Health (social science)

PUBLISHER

SAGE Publications Inc.

H-INDEX

21

PUBLICATION TYPE

Journals

ISSN

0272684X, 15413519

COVERAGE

1980, 1988, 1999, 2004-2021

INFORMATION

Homepage

How to publish in this journal

SCOPE

The Journal publishes applied research, policy and case studies dealing with community health education and its relationship to social change. The Journal stresses systematic application of social science and health education theory and methodology to public health problems and consumer-directed approaches to control of preventive and curative health services. Environmental and structural changes are emphasized and victim-blaming approaches are closely examined.

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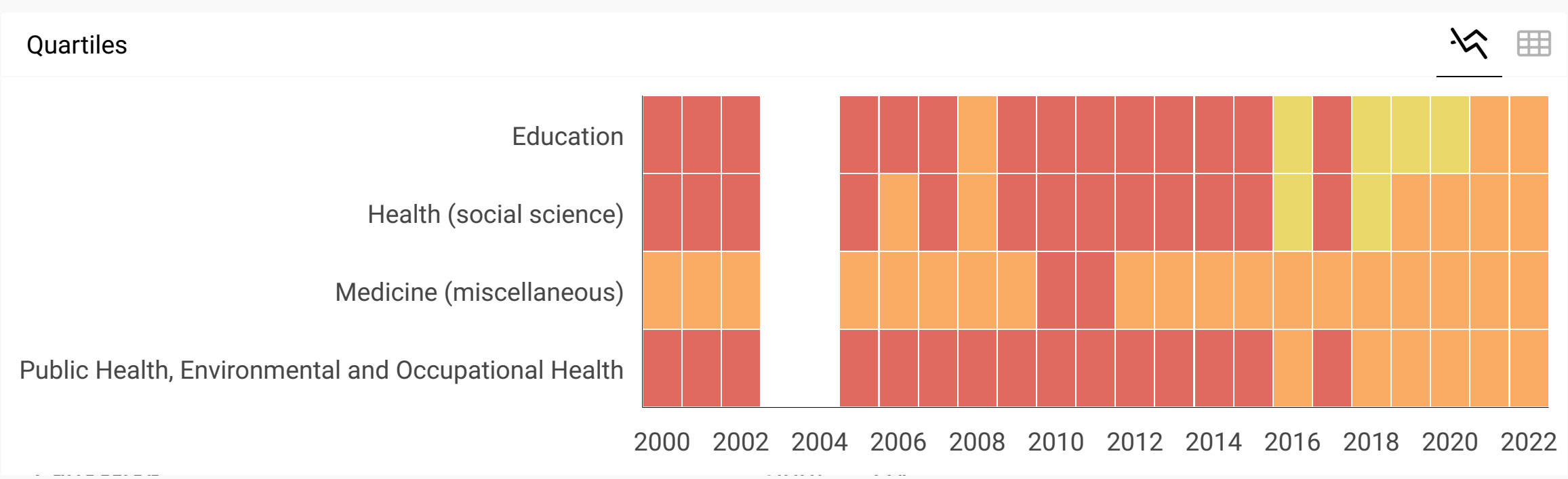

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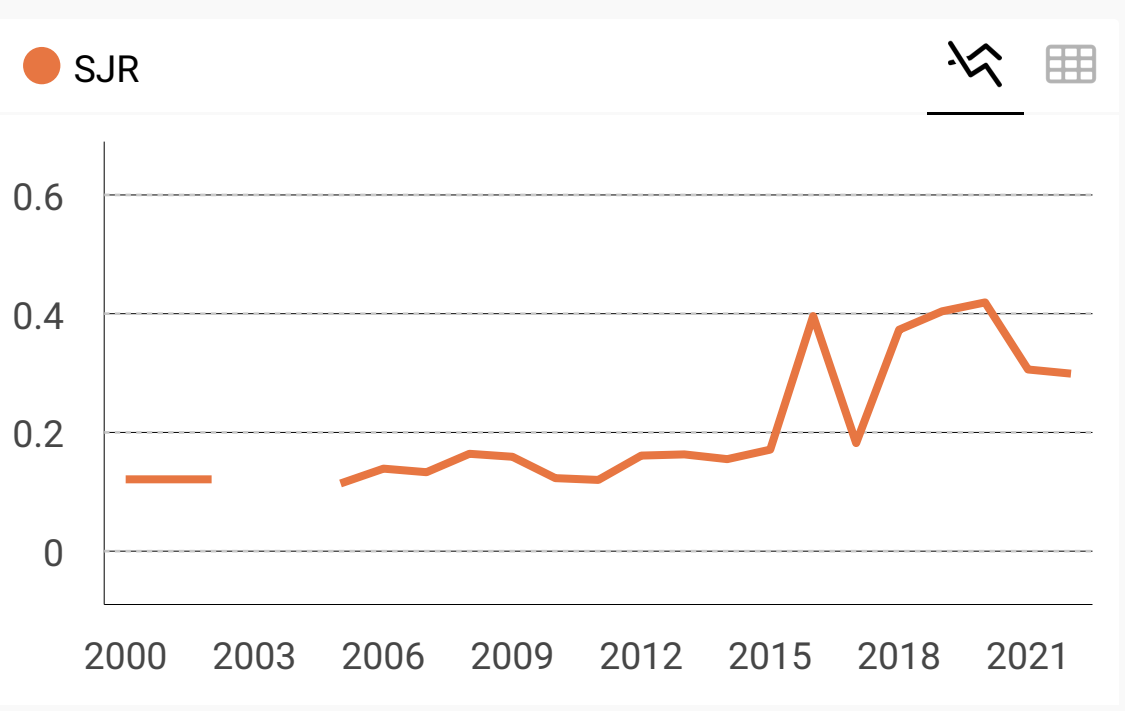

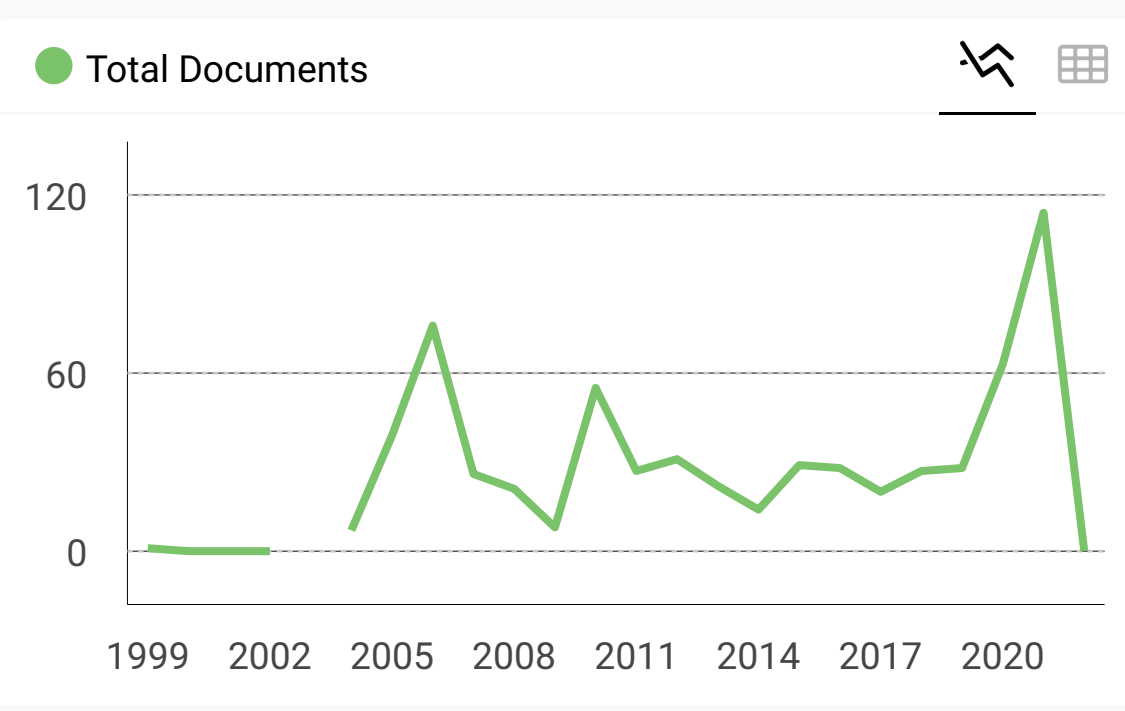

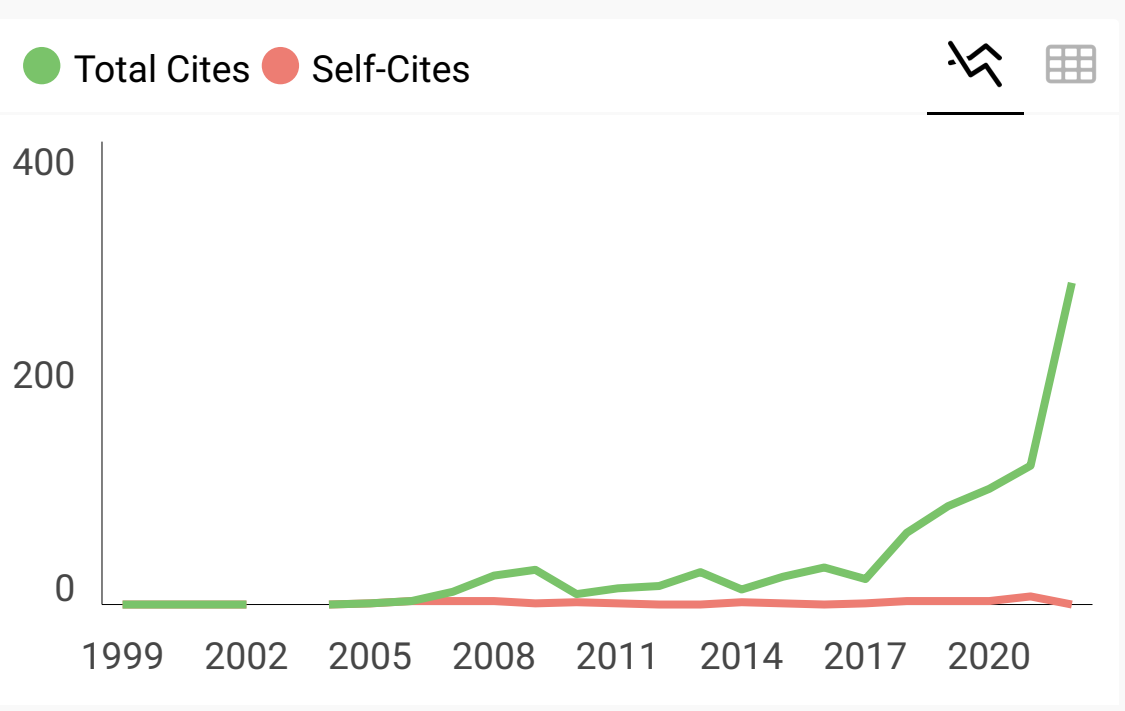

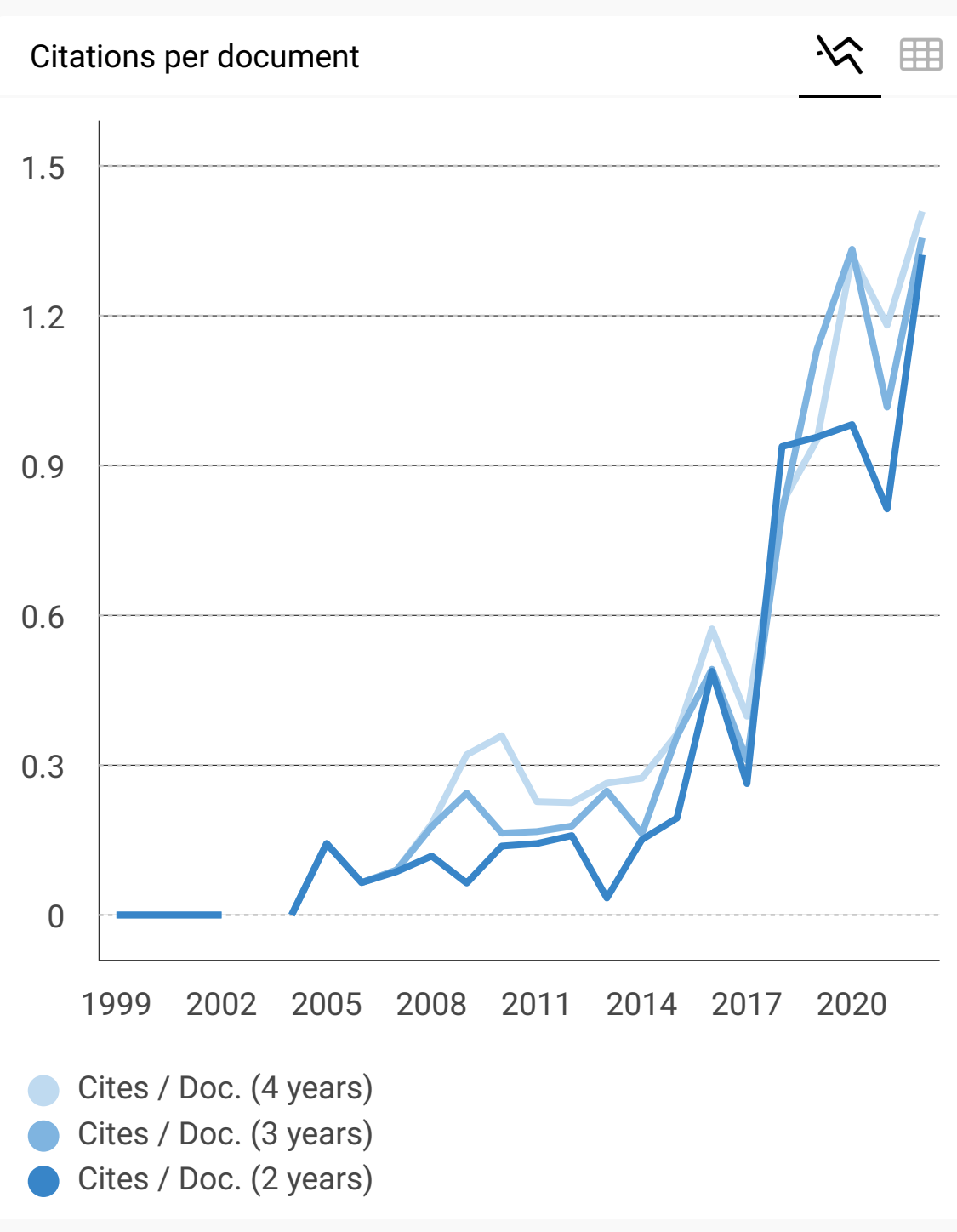

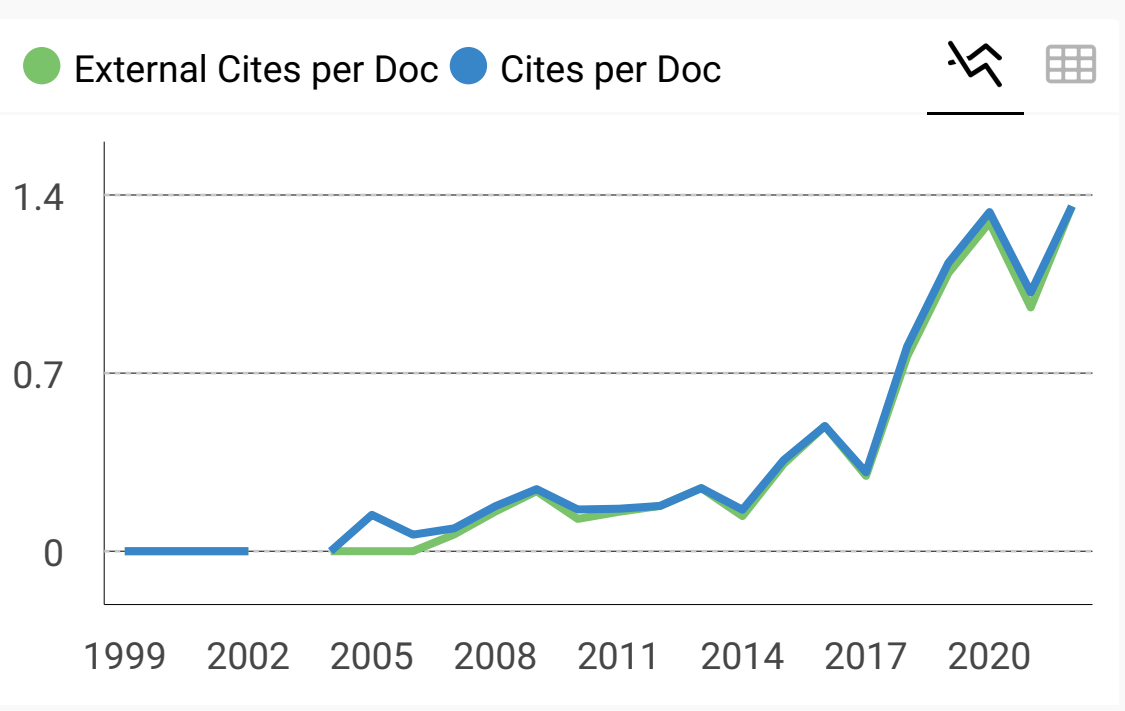

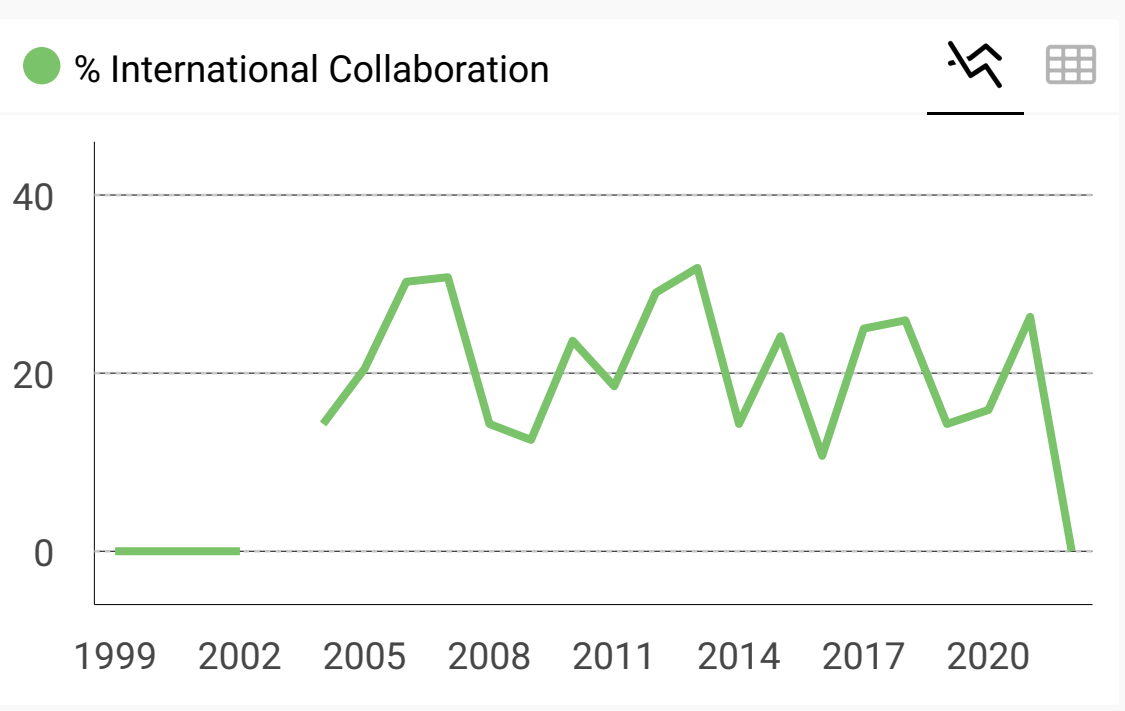

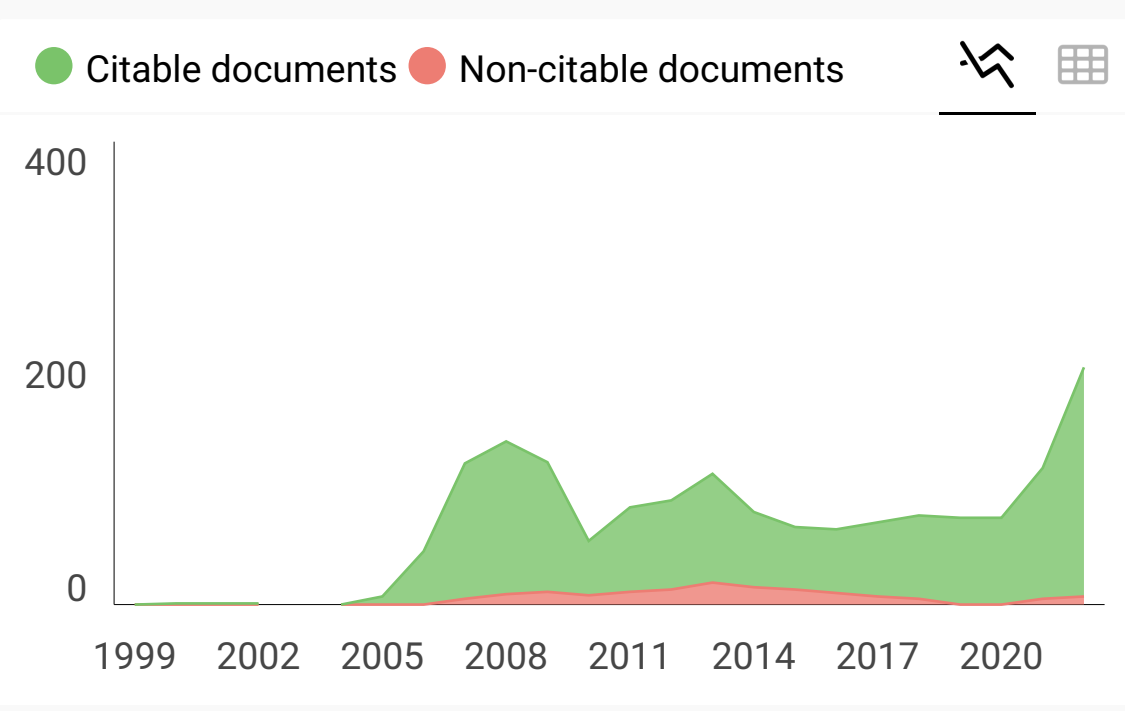

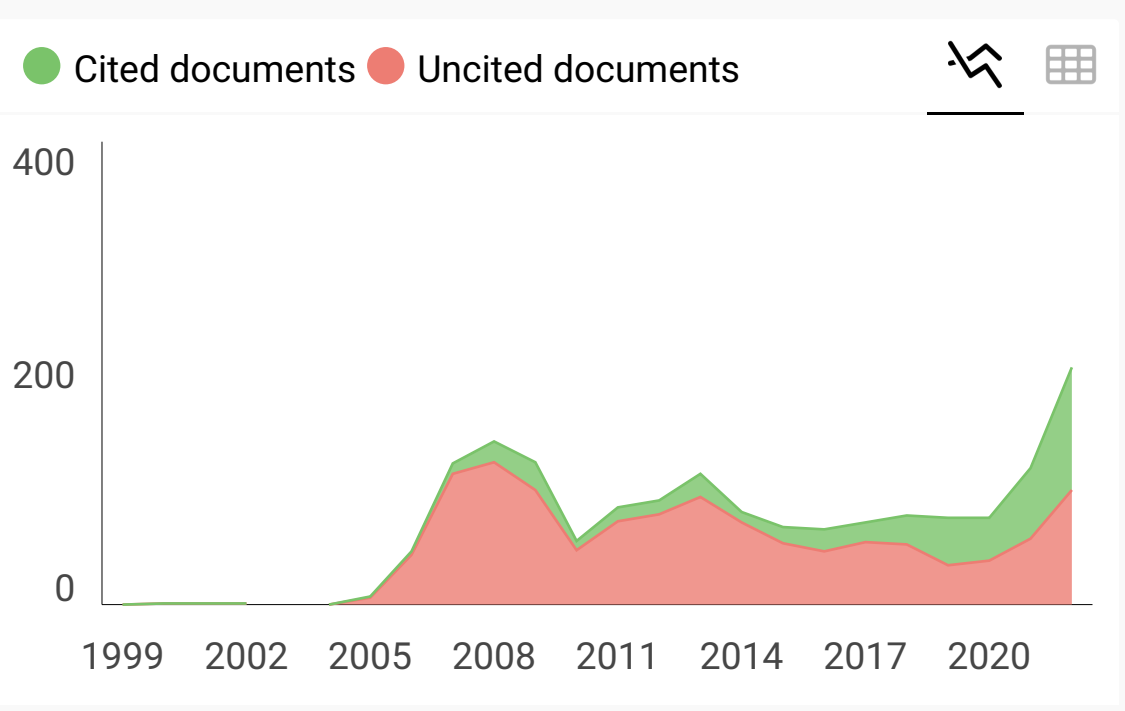

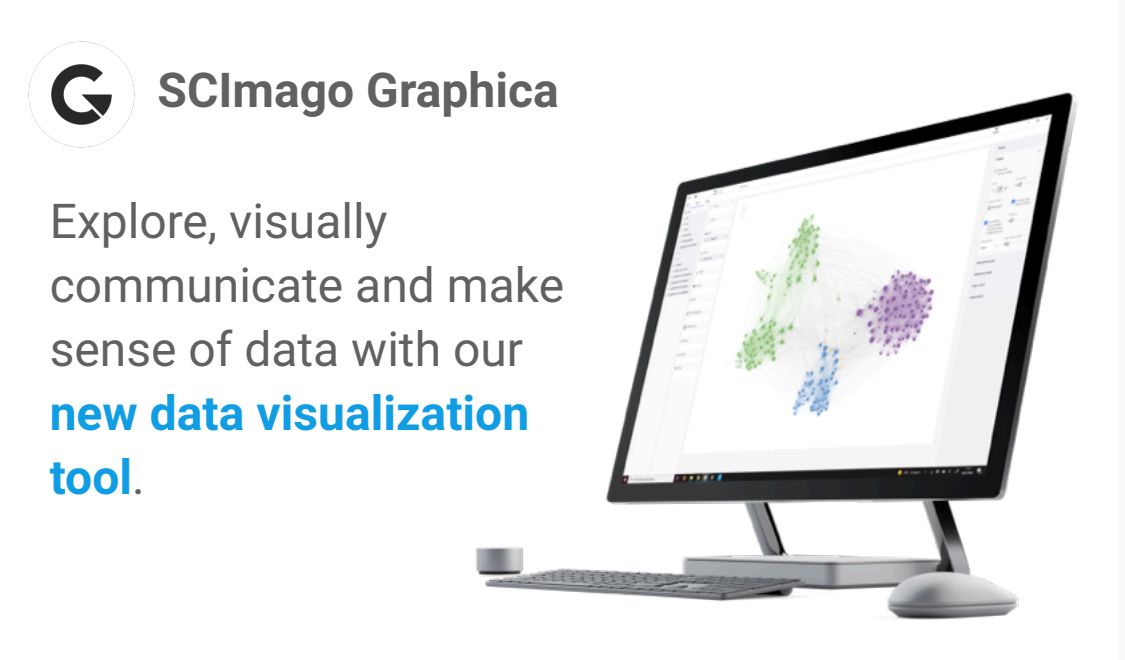

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kamal ismael raheem 1 year ago

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reply

Melanie Ortiz 1 year ago SCImago Team

Dear Kamal,
Thank you for contacting us.
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Best Regards, SCImago Team

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Scopus coverage years: 1980, 1988, 1999, from 2004 to 2021

Publisher: SAGE

ISSN: 0272-684X E-ISSN: 1541-3519

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Social Sciences Health (social science)	#146/344	57th
Medicine Public Health, Environmental and Occupational Health	#318/577	44th

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RE: Community Health Equity Research and Policy - SCOPUS INDEXING QUERY

Isaac Hirsch (he/him/his) <Isaac.Hirsch@sagepub.com>
To: "yosi_wibowo@staff.ubaya.ac.id" <yosi_wibowo@staff.ubaya.ac.id>

Wed, Sep 6, 2023 at 12:09 AM

Dear Yosi,

I hope you are doing well and my apologies for the delay. *Community Health Equity Research & Policy* is indexed with Scopus, but under the prior title of *International Quarterly of Community Health Education* which we transitioned from in 2021. We've notified Scopus and they extended coverage to the current journal title until it is officially listed in the Scopus Journal List.

Thank you,

Isaac Hirsch

Senior Editorial Assistant, Journals STM

(he, him, his)

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On Mon, 4 Sep at 7:50 AM , Yosi Irawati Wibowo 202026 _ <yosi_wibowo@staff.ubaya.ac.id> wrote:

[EXTERNAL]

Dear Sage editorial team

I have not yet received any response. Would you kindly follow-up with the query?

many thanks

Yosi

On Tue, 29 Aug at 3:42 AM , Yosi Irawati Wibowo 202026 _ <yosi_wibowo@staff.ubaya.ac.id> wrote:

[EXTERNAL]

Dear Sage editorial team,

We have published with Community Health Equity Research and Polilcy (CHERP) a while ago, but the article (title: "Community-based approach to promote rational use of antibiotics in Indonesia: The development and assessment of an education program for cadres").

I just would like to confirm whether the journal is indexed at the Scopus?

as I have not found it in the Scopus Journal List.

Please kindly advise with regards to this matter.

Many thanks

Yosi Wibowo

Your manuscript "Community-based approach to promote rational use of antibiotics in Indonesia: The development and assessment of an education program for cadres" has been accepted for publication in Community Health Equity Research and Policy.

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If you have any questions please contact the Editorial Office.

With best wishes,
Sameer Grover
qch@sagepub.com
Community Health Equity Research and Policy Editorial Office