

Supplemental information

Content	Page
Supplemental Figure S1: Example of an inquiry letter sent to a manufacturer	2
Supplemental Figure S2: Influence of different tolerance limits on the rate of out-of-specification medicines (assay results) calculated for medicine samples collected in Cameroon, DR Congo and Malawi	3
Supplemental Figure S3: Additional photo of falsified medicines identified by authenticity inquiries	4
Supplemental Table S1: Comparison of tolerance limits for assay in USP, BP and Ph. Int.	5
Supplemental Table S2: Rate of out-of-specification medicines (assay result) for each type of medicine collected in Cameroon, DR Congo and Malawi, using different tolerance limits	6
Supplemental Table S3: Manufacturers contacted in the authenticity inquiry	7
Supplemental Table S4: Distributors contacted in the authenticity inquiry	16
Supplemental Table S5: List of all products, investigated through authenticity inquiries and the responses of the contacted manufacturer and distributors	20



To

██████████
██████████
██████████

Email: ██████████

Telefon ██████████
Telefax ██████████
E-Mail: ██████████

Tübingen, 14.04.2020

Request for authentication of Sulfatrim® Tablets collected in the Democratic Republic of Congo

Dear Madams and Sirs,

During a study on essential medicines, we have collected approximately 500 medicine samples in Cameroon and the Democratic Republic of Congo in the years 2017 and 2018. These included a product which shows the name of your company on the packaging.

The product details are as follows (photos attached):

Name	Sulfatrim® Co-trimoxazole Tablets BP Sulfamethoxazole and trimethoprim tablets
Stated strength	400/80mg
Manufacturer	██████████
Collected batches (Mfg./Exp. Date)	J7007 (01.2017/12.2019)

For all the approximately 500 medicine samples which we collected in that study, we would like to verify whether they are genuine (or falsified) products by contacting the manufacturers and distributors. We intend to publish the result in a forthcoming paper. It would be most helpful if you could assist us by answering the following two questions to confirm the authenticity of the product:

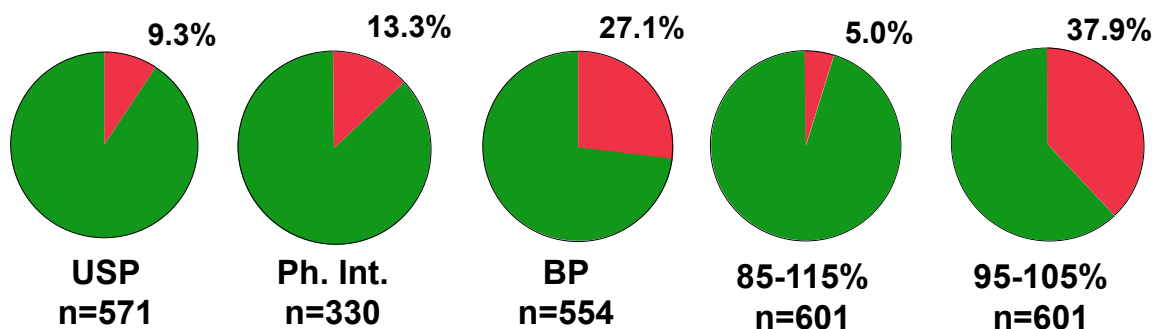
1. Do the batch number and the manufacturing and expiry dates correspond to your records? If yes, do the product and packaging shown on the provided photographs appear to be genuine?
2. To your knowledge, has the batch been distributed in the Democratic Republic of Congo?

We look forward to your response at your earliest convenience, and we will be happy to mention your kind cooperation in the forthcoming publication.

With thanks for your help,
and best wishes

(Prof. Dr. Lutz Heide)

Supplemental Figure S1: Example of an inquiry letter sent to a manufacturer. The original letters included photos of the packaging and dosage units, but these are not shown here.



Supplemental Figure S2: Influence of different tolerance limits on the rate of out-of-specification medicines (assay results) calculated for medicine samples collected in Cameroon, DR Congo and Malawi.

The rates of out-of-specification medicines (OOS: red; in-specification: green) were calculated using the specifications of USP, Ph. Int., BP, and the arbitrary tolerance limits 85-115%^{a, b} and 95-105%^c respectively. For this figure, the assay results of all medicines investigated in the three countries were included.

^a Kaur H et al., 2016. Fake anti-malarials: start with the facts. *Malar J* 15:86.

^b Kaur H et al., 2015. Quality of artemisinin-based combination formulations for malaria treatment: prevalence and risk factors for poor quality medicines in public facilities and private sector drug outlets in Enugu, Nigeria. *PLoS One* 10(5):e0125577.

^c Antignac M et al., 2017. Fighting fake medicines: First quality evaluation of cardiac drugs in Africa. *Int J Cardiol* 243:523-528



Supplemental Figure S3: Additional photo of “Amoxicillin 500 mg + Clavulanic acid 125 mg BP” tablets identified as falsified by authenticity inquiries.

Blister pack with a length of 220 mm, not matching the length of the blister pack of the genuine product which was 195 mm according to the stated distributor.

Supplemental Table S1: Comparison of tolerance limits for assay in USP 42 (2019), BP 2020 and Ph. Int. Ninth Edition (2019)

Product	USP 42 [%]	BP 2020 [%]	Ph. Int. 2019 [%]
Amoxicillin and clavulanic acid tablets	90-120 both	90-105 both	90-120 both
Amoxicillin capsules	90-120	92.5-110.0	no monograph
Amoxicillin tablets	90-120	no monograph	no monograph
Ciprofloxacin tablets	90-120	95-105	no monograph
Doxycycline capsules	90-120	95-105	90-110
Doxycycline tablets	90-120	95-105	90-110
Metronidazole tablets	90-110	95-105	95-105
Penicillin V tablets	90-120	92.5-107.5	90-110
Co-Trimoxazole tablets (sulfamethoxazole and trimethoprim)	93-107 both	92.5-107.5 both	90-110 both
Atenolol tablets	90-110	92.5-107.5	no monograph
Furosemide tablets	90-110	95-105	no monograph
Glibenclamide tablets	90-110	95-105	no monograph
Hydrochlorothiazide tablets	90-110	92.5-107.5	no monograph
Metformin tablets	95-105	95-105	no monograph
Salbutamol tablets	90-110	92.5-107.5	no monograph
Misoprostol tablets	no monograph	no monograph	90-110
Oxytocin injections	90-110	90-110	90-110

Supplemental Table S2: Rate of out-of-specification medicines (assay result) for each type of medicine collected in Cameroon, DR Congo and Malawi, using different tolerance limits.

The rate of out-of-specification medicines was calculated using the specifications of USP 42 (2019), Ph. Int. Ninth Edition (2019) and BP 2020, and the arbitrary tolerance limits 85-115%^{a,b} and 95-105%^c used in previous medicine quality studies. The assay results of all medicines investigated in the three countries were included (n= 601).

Product	n	USP	Ph. Int.	BP	85-115%	95-105%
Amoxicillin and clavulanic acid tablets	31	4 (12.9%)	4 (12.9%)	6 (19.4%)	1 (3.2%)	20 (64.5%)
Amoxicillin capsules	39	0	-	6 (15.4%)	0	22 (56.4%)
Amoxicillin tablets	17	0	-	-	0	4 (23.5%)
Ciprofloxacin tablets	57	5 (8.8%)	-	43 (75.4%)	1 (1.8%)	43 (75.4%)
Doxycycline capsules	28	0	0	12 (42.9%)	0	12 (42.9%)
Doxycycline tablets	22	0	0	13 (59.1%)	0	13 (59.1%)
Metronidazole tablets	57	3 (5.3%)	13 (22.8%)	13 (22.8%)	1 (1.8%)	13 (22.8%)
Penicillin V tablets	41	10 (24.4%)	10 (24.4%)	13 (31.7%)	7 (17.1%)	14 (34.1%)
Co-Trimoxazole tablets (sulfamethoxazole and trimethoprim)	56	1 (1.8%)	0	1 (1.8%)	0	1 (1.8%)
Atenolol tablets	6	0	-	0	0	1 (16.7%)
Furosemide tablets	40	2 (5.0%)	-	5 (12.5%)	1 (2.5%)	5 (12.5%)
Glibenclamide tablets	19	2 (10.5%)	-	8 (42.1%)	0	8 (42.1%)
Hydrochlorothiazide tablets	27	0	-	0	0	1 (3.7%)
Metformin tablets	33	1 (3.0%)	0	1 (3.0%)	0	1 (3.0%)
Salbutamol tablets	33	15 (45.5%)	-	19 (57.6%)	11 (33.3%)	22 (66.7%)
Misoprostol tablets	30	-	7 (23.3%)	-	7 (23.3%)	16 (53.3%)
Oxytocin injections	65	10 (15.4%)	10 (15.4%)	10 (15.4%)	1 (1.5%)	32 (49.2%)

^a Kaur H et al., 2016. Fake anti-malarials: start with the facts. *Malar J* 15:86.

^b Kaur H et al., 2015. Quality of artemisinin-based combination formulations for malaria treatment: prevalence and risk factors for poor quality medicines in public facilities and private sector drug outlets in Enugu, Nigeria. *PLoS One* 10(5):e0125577.

^c Antignac M et al., 2017. Fighting fake medicines: First quality evaluation of cardiac drugs in Africa. *Int J Cardiol* 243:523-528

Supplemental Table S3: Manufacturers contacted in the authenticity inquiry

The authors express their gratitude to those manufacturers who responded to our inquiry and thereby supported this study. These manufacturers are listed in bold letters below.

Stated continent of origin	Stated country of origin	Stated manufacturer	Number of medicine samples collected in Cameroon, DRC and Malawi	Number of contacted e-mail addresses/websites/postal addresses	Number of days between first contact and answer/between reminder and answer	Authenticity confirmed/denied	Distribution in respective country confirmed/denied/not stated
Africa	Benin	Pharmaquick	7	1/1/-	no answer		
	Burundi	Société industrielle Pharmaceutique (SIPHAR)	1	1/-*/-	no answer		
	Cameroon	Africure Pharmaceuticals Cameroon S.A.	2	2/-/-	72/29	confirmed	confirmed
		Cinpharm ¹	3	1/-*/-	no answer		
	DR Congo	Phatkin B.P.	5	2*/-/-*	no answer		
		Zenufa Laboratoire ²	4	2/-/-	no answer**		
	Ghana	Entrance Pharmaceuticals & Research Centre	5	2*/-/-	no answer		
	Kenya	Cosmos Limited	1	1/1/-	84/41	confirmed	denied
		DAWA Limited	7	5/1/-	no answer		
		Elys Chemical Industries Ltd.	3	1/-/-	44/1	confirmed	denied
		Laboratory & Allied Ltd.	2	2/-/-	58/14	confirmed	denied
		MAC'S Pharmaceuticals Ltd.	1	-/-/1	no answer		
		Pharmaceutical Manufacturing Co. Ltd.	1	1/1/-	no answer		
		Regal Pharmaceuticals Ltd.	5	1/-/-	3	confirmed	denied
	Nigeria	New Divine Favour Pharmaceutical Industries Ltd.	1	1*/1/-	no answer		
Senegal	Wintrop Pharma Sénégal Group SANOFI	1	3/1/-	no answer**			

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	Togo	Sprukfield	3	-*/1/1	21	confirmed	confirmed
			1			denied	denied
	Uganda	Kampala Pharmaceutical Industries	7	1/1/-	no answer		
Rene Industries Ltd.		2	2/*/-	no answer			
Americas	British West Indies	Prost Pharma (France)	2	1/1/-	no answer		
	USA	Sandoz US	1	1/-/-	1	confirmed	not stated
Asia	China	Anhui Chengshi Pharmaceutical Co. Ltd	1	1/1/-	no answer		
		Anhui Medipharm Co. Ltd.	1	1/-/-	no answer		
		Chifeng Wanze Pharmaceutical Co. Ltd.	1	-*/1/-	no answer		
		CSPC Ouyi Pharmaceutical Co. Ltd.	21	1*/*/-	no answer		
		CSPC Zhongnuo Pharmaceuticals Co. Ltd.	10	1/-/-	no answer		
		Farmasino Pharmaceutical (Jiangsu) Co. Ltd.	6	2/-/-	no answer		
		Greenfield Pharmaceuticals (Jiang Su) Co. Ltd.	1	3/1/-	no answer		
		Guilin Pharmaceutical Co. Ltd.	4	1*/2/-	no answer		
		Jiangsu Pengyao Pharmaceutical Co. Ltd./ JSPY Pharmaceutical Co. Ltd. ³	5	-*/-/1	no answer		
		Jiangsu Ruinian Qianjin Pharmaceutical Co. Ltd.	4	-/-/1	no answer		

Stated continent of origin	Stated country of origin	Stated manufacturer	Number of medicine samples collected in Cameroon, DRC and Malawi	Number of contacted e-mail addresses/websites/postal addresses	Number of days between first contact and answer/between reminder and answer	Authenticity confirmed/denied	Distribution in respective country confirmed/denied/not stated
		Jiangxi Xier Kangtai Pharmaceutical Co. Ltd./ Shanxi Lianbang Pharmaceutical Co. Ltd. ⁴	7	3/1/-	no answer		
		Jinzhou Jiuyang Pharmaceutical Co. Ltd	3	1/1/-	no answer		
		Nanjing Baijingyu Pharmaceutical Co. Ltd.	3	2*/-*/-	no answer		
		Nanjing Sino Pharmaceutical Ltd.	1	1/1/-	no answer		
		NCPC North Best/ NCPC, PRC/ North China Pharmaceutical Co. Ltd. ⁵	8	2/1/-	no answer		
		Ningbo Pharma Biotech Co. Ltd. China	38	1/-/1	no answer		
		Ningbo Shuangwei Pharmaceutical Co. Ltd	6	-/-/1	no answer		
		Reyoung Pharmaceutical Co. Ltd.	9	3/-/-	34/1	confirmed	confirmed
		Shandong Shenglu Pharmaceutical Co. Ltd/ Sishui xier Kang Pharmaceutical Co.Ltd. ⁶	5	1/1*/-	no answer		
		Shandong Xier Kangtai Pharm Co. Ltd/ Yanzhou Xierkangtai pharmaceutical Co. Ltd. ⁷	4	1/-/-	no answer		
		Shandong Yikang Pharmaceutical Co. Ltd.	2	-*/1/-	no answer		
		Shanghai Juchen Import and Exports Co. Ltd.	4	1/-/-	no answer		

Stated continent of origin	Stated country of origin	Stated manufacturer	Number of medicine samples collected in Cameroon, DRC and Malawi	Number of contacted e-mail addresses/websites/postal addresses	Number of days between first contact and answer/between reminder and answer	Authenticity confirmed/denied	Distribution in respective country confirmed/denied/not stated
		Sinochem Jiangsu Co. Ltd	14	2/*/-	no answer		
	Hong Kong	Hongkong Prost Medicines and Health Products Co. Ltd.	3	-/-/1	no answer		
	India	Acme Formulation Pvt. Ltd.	1	1/-/1	36/0	confirmed	confirmed
		Aculife Healthcare Pvt. Ltd.	2	*-/-/1	no answer		
		Agog Pharma Ltd.	4	2*/*/-	1	confirmed	denied
		Alkem Laboratories Ltd.	1	1/1/-	4	confirmed	not stated
		Arco Pharma Pvt. Ltd.	7	2/-/-	45/2	confirmed	confirmed
		Asence Pharma Pvt. Ltd.	6	2/*/-	no answer		
		Astra Lifecare Pvt. Ltd.	11	2/*/-	no answer		
		Aura pharmaceuticals Pvt. Ltd.	9	3/1/-	no answer		
		Aurobindo Pharma Ltd.	1	3*/*/-	66/23	confirmed	denied
		Axon Drugs Pvt. Ltd.	1	2/-/-	59/15	confirmed	denied
		Bliss GVS Pharma Ltd.	1	3/*/-	no answer		
		Cadila Healthcare Ltd.	1	3/1/-	no answer		
		Centurion Healthcare Private Limited	2	1/-/1	36	confirmed	not stated
		Cipla Ltd.	1	1/-/-	21	confirmed	confirmed
		Ciron Drugs and Pharmaceuticals Pvt. Ltd.***	4	1/-/-	5	confirmed	confirmed
			2	3/1/-	no answer		
		Combitic Global Caplet Pvt. Ltd.	1	2/-/-	4	confirmed	confirmed
		Fourrts (India) Laboratories Pvt. Limited***	3	2/1/-	no answer		
	21		1/-/1	no answer			
	Gland Pharma Ltd.	2	1/-/-	1	confirmed	not stated	

Stated continent of origin	Stated country of origin	Stated manufacturer	Number of medicine samples collected in Cameroon, DRC and Malawi	Number of contacted e-mail addresses/websites/postal addresses	Number of days between first contact and answer/between reminder and answer	Authenticity confirmed/denied	Distribution in respective country confirmed/denied/not stated
		Global Pharma Healthcare Pvt. Ltd.	4	3/-/-	45/1	confirmed	confirmed
		Holden Medical Laboratories Pvt. Ltd.	3	2/-/-	44/0	confirmed	confirmed
		Intermed	1	3/-/-	44/0	confirmed	not stated
		Ipca Laboratories Ltd.	1	3*/1/-	no answer**		
		J. B. Chemicals and Pharmaceuticals Ltd.	1	3/-/-	no answer		
		Kopran Limited	2	3*/1/-	no answer		
		Leben Laboratories Pvt. Ltd.	1	1/-/-	6	confirmed	denied
		Lincoln Pharmaceuticals Ltd.	8	3/1/-	no answer		
		Lord Lifescience Pvt. Ltd.	1	1/1/-	no answer		
		Macin Remedies India Ltd.	1	1/-/1	no answer		
		Macleods Pharmaceuticals Ltd.	4	3/-/-	no answer**		
		Mancare pharmaceutical Ltd.	3	1*/-/-	no answer		
		Maneesh Pharmaceuticals Ltd.	1	1*/1/-	no answer		
		Maxheal Laboratories Pvt. Ltd.	2	2/1/-	no answer		
		Maxtar Bio-Genics	14	3*/-/-	44/1	confirmed	confirmed
		Medicamen Biotech Ltd.	8	2/-/-	2	confirmed	confirmed
		Medicef Pharma	4	3/-/-	6	confirmed	not stated
		Medico Remedies Pvt. Ltd.	2	2/-/-	2	confirmed	denied
		Medley Pharmaceuticals Ltd.	5	3*/-/-	6	confirmed	denied

Stated continent of origin	Stated country of origin	Stated manufacturer	Number of medicine samples collected in Cameroon, DRC and Malawi	Number of contacted e-mail addresses/websites/postal addresses	Number of days between first contact and answer/between reminder and answer	Authenticity confirmed/denied	Distribution in respective country confirmed/denied/not stated
		Medopharm Pvt. Ltd.	37	2/-/-	51/6	confirmed	not stated
			2			denied	not stated
		Mepro Pharmaceuticals Pvt. Ltd.	1	2*/-/-	no answer		
		Micro Labs Ltd.	4	2/-/-	44/1	denied	denied
		Milan Laboratories (India) Pvt. Ltd.	3	2/-/-	0	confirmed	confirmed
			1			confirmed	denied
		Nem Laboratories Pvt. Ltd.	1	1/1/-	44/2	confirmed	denied
		Osaka Pharmaceuticals Pvt. Ltd.	3	1/*-/-	no answer		
		PIL Pharmaceuticals Pvt. Ltd.	1	3/-/-	1	confirmed	not stated
		Prashi Pharma Pvt. Ltd.	6	1/*-/-	no answer		
		Sakar Healthcare Ltd.	1	1/-/1	no answer		
		Shalina Laboratories Pvt. Ltd.	1	1/-/-	3	confirmed	confirmed
		Sparsh Bio-Tech Pvt. Ltd.	7	1/-/-	50/1	confirmed	denied
		Strides Arcolab Limited/ Strides Shasun Limited ⁸	34	3/1/-	no answer		
		Triveni Formulations Limited	1	1/-/-	no answer		
		Ultra Care International	2	-/*-/1	no answer		
		Umedica Laboratories Pvt. Ltd.***	1	1/-/1	71/35	confirmed	confirmed
			1	3/1/-	no answer		
		Zee Laboratories	1	3/1/-	no answer		
		ZIM Laboratories Ltd.	1	1/1/-	no answer		
One sample stating "Made in India", but stating only	1	not contacted					

Stated continent of origin	Stated country of origin	Stated manufacturer	Number of medicine samples collected in Cameroon, DRC and Malawi	Number of contacted e-mail addresses/websites/postal addresses	Number of days between first contact and answer/between reminder and answer	Authenticity confirmed/denied	Distribution in respective country confirmed/denied/not stated
		the distributor but not manufacturer on the available packaging					
	Sultanat of Oman	National Pharmaceutical Industries Co. (SAOG)	1	1*/-/1	no answer		
	Turkey	Bilim Pharmaceuticals	1	1/-/-	16	confirmed	confirmed
Europe	Austria	Sandoz GmbH	10	1*/1/-	no answer		
	Belgium	Merck n.v./s.a	3	2/-/-	8	confirmed	denied
	Cyprus	Medochemie Ltd.	2	1/1/-	9	confirmed	denied
		Remedica Ltd.	2	1/-/-	1	confirmed	denied
	France	Delpharm Reims	1	3/1/-	no answer		
		Famar Lyon	1	1/*/-/-	no answer		
		Glaxo Welcome Production	3	1/-/-	46/3	confirmed	confirmed
		Laboratoire Bailly-Creat	6	1/1/-	no answer		
		Rotexmedica GmbH Arzneimittelwerk	2	1/-/-	1	confirmed	not stated
		Sanofi-Winthrop Industrie	6	2/1/-	3	confirmed	confirmed
	Germany	Aspen Bad Oldesloe GmbH	1	3/1/-	no answer**		
		Berlin Chemie	1	1/-/-	1	confirmed	confirmed
		Denk Pharma GmbH & Co. KG	12	1/-/-	no answer		
		Salutas Pharma GmbH	2	2/1/-	no answer		
	Italy	Biologici Italia Laboratories S.r.l.	14	1/-/1	41/5	confirmed	not stated
		Errekappa Euroterapici S.p.A	1	1*/-/-	53/9	confirmed	denied
		Laboratori Guidotti S.p.A	1	*/1/-	no answer		
Spain	Ferrer Internacional S.A.	3	2/1/-	no answer			

Stated continent of origin	Stated country of origin	Stated manufacturer	Number of medicine samples collected in Cameroon, DRC and Malawi	Number of contacted e-mail addresses/websites/postal addresses	Number of days between first contact and answer/between reminder and answer	Authenticity confirmed/denied	Distribution in respective country confirmed/denied/not stated
		Novartis Farmacéutica S.A.	14	1/-/-	5	confirmed	confirmed
	Sweden	Bluefish Pharmaceuticals AD	1	1/-/-	4	confirmed	denied
	UK	Piramal Healthcare UK Ltd.	1	1/-/-	14	confirmed	not stated
		Sonmart Pharma (UK)	6	-/-/1	no answer		
Not stated	Not stated	Cinpharm ¹	3	1/*/-	no answer		
		One sample stating only the distributor but not the manufacturer on the available packaging	1	not contacted			
	Number of contacted manufacturers and total number of samples		126 manufacturers; 582 samples				
	Response rate (based on number of contacted manufacturers who provided an authenticity statement)		49 (38.9%)				
	Response rate (based on number of samples from contacted manufacturers with authenticity statement)		203 (34.9%)				

¹ For three of the six samples from Cinpharm, it was not stated whether they had been manufactured in Cameroon or by their partner Cipla Ltd. in India, therefore these three samples were listed in the category "Continent of origin not stated". Inquires for all six samples were sent to Cinpharm in Cameroon.

² Zenufa Laboratoire stated that they were not able to check the authenticity of the requested medicines, as their records were lost during a fire.

³ The name of this manufacturer was given on different samples as "Jiangsu Pengyao Pharmaceutical Co. Ltd." or as "JSPY Pharmaceutical Co. Ltd.". Since they appear to have the same contact address, they were considered as a single manufacturer in this study.

⁴ According to our research "Jiangxi Xier Kangtai Pharmaceutical Co. Ltd." and "Shanxi Lianbang Pharmaceutical Co. Ltd." belong both to the company "Jiangxi Medicine Imp. & Exp. Co. Ltd." and were therefore considered as a single manufacturer in this study.

⁵ The name of this manufacturer was given on different samples as "North China Pharmaceutical Co. Ltd.", or as "NCPC, PRC", or as "NCPC North Best". Since all of them appear to have the same contact address, they were considered as a single manufacturer in this study.

⁶ The name of this manufacturer was given on different samples as "Shandong Shenglu Pharmaceutical Co. Ltd" or "Sishui xier Kang Pharmaceutical Co. Ltd.". Since all of them appear to have the same contact address, they were considered as a single manufacturer in this study.

⁷ The name of this manufacturer was given on different samples as "Shandong Xier Kangtai Pharm Co. Ltd." or as "Yanzhou Xierkangtai pharmaceutical Co. Ltd.". Since all of them appear to have the same contact address, they were considered as a single manufacturer in this study.

⁸ Strides Arcolab Ltd. changed its name to Strides Shasun Ltd. in 2015 after the amalgamation of Shasun Pharmaceuticals with Strides Arcolab in 2014. “Strides Arcolab Limited” and “Strides Shasun Limited” were therefore considered as a single manufacturer in this study.

* Authenticity inquiries were sent to additional e-mail addresses, websites or postal addresses, which turned out to be invalid or could not be contacted due to other reasons (e.g. full mailbox, interruption of postal services due to the Corona pandemic).

** An answer was received from the respective manufacturer, but without statement of authenticity.

*** The three manufacturers Ciron Drugs and Pharmaceuticals Pvt. Ltd., Fourrts (India) Laboratories Pvt. Limited and Umedica Laboratories Pvt. Ltd. were contacted twice, in December 2019 for authentication of oxytocin or misoprostol samples and again in March 2020 for authentication of other types of medicines. The results of both inquiries were evaluated separately.

Supplemental Table S4: Distributors contacted in the authenticity inquiry

The authors express their gratitude to those distributors who responded to our inquiry and thereby supported this study. These distributors are listed in bold letters below.

Stated continent of origin of distributor	Stated country of origin of distributor	Stated distributor	Number of medicine samples collected in Cameroon, DRC and Malawi	Number of contacted e-mail addresses/websites/postal addresses	Number of days between first contact and answer/between reminder and answer	Authenticity confirmed/denied	Distribution in respective country confirmed/denied/not stated
Africa	Cameroon	3N PHARMA DISTRI Sarl	1	3/-/-	41/0	confirmed	confirmed
	DRC	Arauphar Production	1	-*/-/* not contacted			
		Asrams	2	1*/-/-	no answer		
		New Cesamex S.P.R.L.	21	1/1/-	no answer		
		New Span Kinshasa R.D. Congo	2	1/1/-	no answer**		
		Pharma Plus S.A.R.L. (Paloma)	7	-/-/* not contacted			
		Prince Pharma	6	1/*-/-	no answer		
	Kenya	Medisel (K) Ltd.	1	1/1/-	no answer		
	Malawi	Banja La Mtsogolo	1	1/-/1	39/4	confirmed	confirmed
		WORLDWIDE PHARMACEUTICAL DISTRIBUTORS	38	1/-/-	11	confirmed	not stated
	Nigeria	Aphantee Pharmaceuticals Nig. Ltd	1	1/-/-	no answer		
		Embassy Pharmaceuticals & Chemicals Ltd. Lago Nigeria	1	-*/1*/-/-	no answer		
		Jamelia Pharm. Nig. Ltd.	1	1/-/-	no answer		
		Klusyl International Co. Ltd.	2	1/-/-	no answer		
		Manfes Pharmaceuticals Ltd.	6	-/-/* not contacted			

Stated continent of origin of distributor	Stated country of origin of distributor	Stated distributor	Number of medicine samples collected in Cameroon, DRC and Malawi	Number of contacted e-mail addresses/websites/postal addresses	Number of days between first contact and answer/between reminder and answer	Authenticity confirmed/denied	Distribution in respective country confirmed/denied/not stated
		Nkoyo Chemists Nigeria	1	1/-/-	50/1	confirmed	not stated
		Surelife Pharmaceutical Industry Ltd.	2	-*/1/-*	no answer		
		Transglobe Pharmaceuticals Co. Ltd.	4	1*/-*/*	no answer		
	Togo	Sprukfield	2	-/1/1	21	confirmed	confirmed
	Uganda	Abacus Pharma (A) Ltd. East Africa	2	-*/1/-	no answer		
Americas	British West Indies	Prost Pharma (France) Co. Ltd.	3	1/1/-	no answer		
Asia	Dubai	Shalina Healthcare DMCC/ Shalina Laboratoire Pvt. Ltd.¹	10	1/-/-	3	confirmed	confirmed
	Hong Kong	CMEC Hongkong Co. Ltd.	6	1/*/-	no answer		
	India	Bliss GVS Pharma Ltd.	1	3/*/-	no answer		
		Cachet Pharmaceuticals Pvt. Ltd.	1	2/1/-	no answer		
		Cadila Healthcare Ltd.	2	3/1/-	no answer		
		Fourrts (India) Laboratories Pvt. Limited	1	2/1/-	no answer		
		Indus Lifescience Pvt. Ltd.	1	1/-/-	2	confirmed	denied
		Naman Pharma Drugs	1	1/-/-	50/2	confirmed	confirmed
Ubithera Pharma Pvt. Ltd.	5	1/-/-	1	confirmed	confirmed		
Europe	Austria	Sandoz GmbH	2	1*/1/-	no answer		
	Belgium	TABRAD SPRL	6	-/-/1	12	confirmed	confirmed
	Denmark	Missionpharma	16	1/-/-	12	confirmed	confirmed
			1			confirmed	denied
France	Merck Santé s.a.s	1	1/-/-	no answer			

Stated continent of origin of distributor	Stated country of origin of distributor	Stated distributor	Number of medicine samples collected in Cameroon, DRC and Malawi	Number of contacted e-mail addresses/websites/postal addresses	Number of days between first contact and answer/between reminder and answer	Authenticity confirmed/denied	Distribution in respective country confirmed/denied/not stated	
	Germany	GSK	4	4/1/-	no answer**			
	Germany	ZMC Hamburg GmbH ²	8	4/-/1*	no answer**			
	Luxembourg	Laboratoires Bailleul	1	*/1/-	no answer			
	The Netherlands	Amstelpharma	2	1/-/-	21	confirmed	confirmed	
			IDA Foundation***	2	1/-/-	1	confirmed	confirmed
				27	8/1/-	109/82 ³	confirmed	confirmed
				1			denied	denied
				4			denied	denied
			Imres B.V.	15	2/-/-	50/2	confirmed	confirmed
	Svizera Europe B.V.	1	1/1/-	no answer				
	UK	GB Pharma Limited	1	1/-/-	no answer			
			Pfizer Limited	1	1/-/-	1	confirmed	not stated
Unimed International Ltd. ⁴			1	1/-/-	no answer**			
Number of stated distributors and respective number of samples. (Three distributors, representing 14 samples, could not be contacted)			45 distributors, 227 samples (42 contacted distributors, representing 213 samples) ⁵					
Response rate (based on number of contacted distributors who provided an authenticity statement)			16 (38.1%)					
Response rate (based on number of samples from contacted distributors with authenticity statement)			135 (63.4%)					

¹ The name of this distributor was given on different samples as “Shalina Healthcare DMCC” or as “Shalina Laboratoire Pvt. Ltd.”. Since they state the same website and company logo on the packaging, they were considered as a single distributor in this study.

² The letter to “ZMC Hamburg GmbH” could not be delivered to the specified address (Rantzaustr. 102, 22041 Hamburg, Germany). According to our investigations, the name of the manufacturer’s company is “Zhejiang Medicines and Health Products Import & Export Co., Ltd.”. E-mails and a letter were therefore sent to the company’s Chinese address.

³ A reminder was sent to IDA Foundation immediately after the two falsifications were identified by the respective manufacturer (Micro Labs Ltd. and Medopharm Pvt. Ltd.). Therefore, the time between first contact and reminder was four instead of six weeks. The confirmation of the second falsified medicine and the authenticity confirmation of the other 27 other samples was only received after 109 days and therefore not within the time frame of three month. However, this response was still included in our evaluation, as we already received a response from IDA earlier.

⁴ A message was received that the company Unimed International Ltd. had ceased its trading activities and the directors have retired. It was stated that the records were in storage and could not be checked due to the Corona pandemic restrictions. It has been reported that Unimed International Ltd. distributed substandard propofol to Zambia (Mumphansa *et al.*, 2017. An analysis of substandard propofol detected in use in Zambian anesthesia. *Anesthesia & Analgesia* 125:616-619) and went into voluntary liquidation in January 2019 (Bannenberg W, 2020. [e-drug] Substandard propofol supplied by UNIMED in Zambia (17). Available at: <http://lists.healthnet.org/archive/html/e-drug/2020-04/msg00002.html>)

⁵ Arauphar Production, Pharma Plus S.A.R.L. (Paloma) and Manfes Pharmaceuticals Ltd. could not be contacted.

* Authenticity inquiries were sent to additional e-mail addresses, websites or postal addresses, which turned out to be invalid or could not be contacted due to other reasons (e.g. full mailbox, interruption of postal services due to the Corona pandemic).

** An answer was received from the respective distributor, but without statement of authenticity.

*** IDA Foundation was contacted twice, in December 2019 for authentication of oxytocin or misoprostol samples and again in March 2020 for authentication of other types of medicines. The results of both inquiries were evaluated separately.