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Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our Editorial Policies and the Editorial Policy Checklist.

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed	
☐	☒	The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
☐	☒	A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒	The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☐	☒	A description of all covariates tested
☐	☒	A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒	A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☐	☒	For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted *Give P values as exact values whenever suitable.*
☒	☐	For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☒	☐	For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☐	☒	Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated

Our web collection on statistics for biologists contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection	For survey data collection, we relied on the open source ODK platform (https://getodk.org/). The remote tracking devices (Sentries and Sentinels) were purchased commercially from OnAsset Technologies as part of a research partnership. Sentries report to a central server owned by OnAsset and accessible only by the researchers. Subsequent to analysis, the PIs download JSON format data from the server using R (Version 4.2). See the SI for further details on the devices.
Data analysis	All statistical analysis was conducted using R (Version 4.4).

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our policy

Source and replication data will be available at https://dataverse.harvard.edu/dataverse/medicinetheft/ prior to publication. Per agreement with partners and review boards, all data are anonymized and geographically non-specific.

Research involving human participants, their data, or biological material

Policy information about studies with human participants or human data. See also policy information about sex, gender (identity/presentation), and sexual orientation and race, ethnicity and racism.

Reporting on sex and gender	For household surveys, our enumerators were instructed to select on female heads of household where possible, where this was impossible, they interviewed the male head of household. This means that over 85% of our sample is female. These data are included in the raw data, but these data cannot be used to identify a gender-specific effect since these two types of interviews are systemically different in household characteristics. Our other surveys did not collect gender-specific data.
Reporting on race, ethnicity, or other socially relevant groupings	Our surveys of community residents we recorded respondents' self-reported tribal identification, but no other social groupings. To identify tribe, respondents could either select from a list of the main tribes in Malawi, or they could select another tribal identification. We do not include tribe in any analysis. As most communities consist of a single tribe, tribal affiliation is not particularly relevant to our analysis.
Population characteristics	Summary information on population characteristics are available in SI 4.3.
Recruitment	At each of the 97 randomly sampled health facilities in Southern Malawi, we recruited two distinct groups of participants for the survey. First, the enumeration team completed a random walk sampling protocol to recruit 35 individuals living within 10 km of the health facility. This resulted in a sample of 3,360 individuals who completed a survey containing 61 questions regarding patient experiences at the facility, focusing on their observations and perceptions of theft, as well as a list experiment to measure the prevalence of public medicine resale and 14 questions for the enumerator about the survey context. Second, the enumeration team used a purposive sampling procedure to recruit three individuals affiliated with the facility's citizen oversight committee (the Health Centre Advisory Committee). This resulted in a sample of 281 individuals who completed a survey containing 20 questions regarding the operations and activities of the committee. All surveys were conducted in person with trained Malawian enumerators and available in English and Chichewa. Finally, we executed an endline phone-based survey of health facility officials. At each of the 97 facilities included in the baseline survey, the Malawi-based research managers used snowball convenience sampling to conduct a phone interview with two individuals: a pharmacist and one other official involved in medicine stocking and/or disbursement at the facility. Contact information could not be obtained for 12 facilities, so the final sample includes 172 officials from 85 facilities. The survey included 30 questions for the participant regarding their experiences at the facility, focusing on their observations and perceptions of theft, as well as four questions for the enumerator to collect information about the survey context. As no one refused to participate in the survey, we do not expect that sample selection bias introduces error into our estimates. There is some potential bias introduced by the availability of contact information for the endline survey. However as the endline survey is not used in any statistical analysis, this is not a threat to our conclusions.
Ethics oversight	This research was reviewed and approved by [University Name Anonymized] and the Malawi National Health Science Research Committee.

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☐ Life sciences ☒ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	Using remote tracking devices and in-personal audits, we track 2,400 government-provisioned medicine boxes in real time from government facilities to final clinics and pharmacies. We combine tracking data with survey data from 3,360 individuals and 453 health officials in order to assess the frequency, causes and consequences of medicine theft and diversion in Malawi, country hampered by public sector corruption.
Research sample	Our research sample includes 2,387 tracked medicine boxes and surveys with 3,360 individuals and 453 health officials. The surveys of individuals and health officials were conducted in the areas surrounding 97 randomly selected health officials. See SI 3 for further details on the tracking devices and SI 4 for further details on the survey samples.
Sampling strategy	For enumeration, we randomly sampled 97 public health facilities in southern Malawi. Within each, we recruited two distinct groups of participants for the survey. First, the enumeration team completed a random walk sampling protocol to recruit 35 individuals living within 10 km of the health facility. This resulted in a sample of 3,360 individuals who completed a survey containing 61 questions regarding patient experiences at the facility, focusing on their observations and perceptions of theft, as well as a list experiment to measure the prevalence of public medicine resale and 14 questions for the enumerator about the survey context. Second, the enumeration team used a purposive sampling procedure to recruit three individuals affiliated with the facility's citizen oversight committee (the Health Centre Advisory Committee). This resulted in a sample of 281 individuals who completed a survey containing 20 questions regarding the operations and activities of the committee. All surveys were conducted in person with trained Malawian enumerators and available in English and Chichewa. Survey participants were all compensated for their time. For medicine tracking, we relied on purposive sampling. Using health facility orders provided to us by the Ministry of Health, and drawing on survey and interview data, we sampled eight medicines that are both commonly ordered and commonly diverted. Trained delivery officials were instructed to place devices on a maximum of 30 units intended for facilities and 50 units intended for district health offices. This usually encompassed the entire order. Sample sizes were determined based on a pre-registered power analysis using expected rates of theft and treatment effects. See the anonymized pre-analysis plan in the SI. For further details on sampling, see Section "Methods", SI 3 and 4 and discussion of recruitment above.
Data collection	For enumeration, respondents were mostly interviewed in-person; though some interviews with health facility staff were conducted over the phone (see Health Facility Surveys in the main text). Enumeration was conducted in Chichewa and English per recipient proference. Where possible, enumerators were instructed to interview the female head of household. To help ensure protocol compliance, enumerators worked in pairs and entered survey data into a tablet in real-time. Enumerators reported back to local team managers on a daily basis and survey data was checked for compliance. Enumerators were told that they were working on a project about health access, but were blinded to all hypotheses and specific research questions. Enumeration could not always be conducted in complete privacy, however enumerators were instructed to note if they felt the respondent appeared to be influenced by another person in their answer; or if they felt the respondent might be dishonest. Enumerators made a note of influence this in 3.1% of interviews, however almost all instances were cases in which children (or, more rarely, the husband) tried to clarify a question; or made an unsolicited comment to the enumerator about the local health facility. In none of these cases did the enumerator indicate that they felt the response was dishonest.
Timing	Data was collected from March 2019 to January 2022. See SI 2 for a complete timeline.
Data exclusions	No data are excluded from the surveys; however there was some attrition in the remote tracking data. As noted in the main text, for 10% of tracked medicines, we could precisely determine the delivery location, most often due to device failure or because the density of cellular towers or satellite connections was too low to determine the likely location of the medicine. These medicines are excluded from analysis.
Non-participation	No respondent refused to participate in the surveys; though 4 individuals that were recruited for the survey of community residents were not interviewed due to the fact they worked at the health facility.
Randomization	Respondents were not allocated into experimental groups, except for the purposes of the list experiments used to elicit experience with medicine theft. We used simple randomization for the list experiment: with probability 0.5 respondents were assigned to treatment and similarly to control. As we note in SI 9, we also conducted a branding experiment in concert with this study using simple randomization to treatment and control at the level of tracked medicine. As we estimate null effect of this intervention, we do not discuss this intervention in the main text.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Plants

Seed stocks	Not applicable
Novel plant genotypes	Not applicable
Authentication	Not applicable