Interventions to overcome the challenges for identifying Substandard, Spurious, Falsely Labeled, Falsified and Counterfeit drugs (SSFFC). A Systematic Review

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❑*Objective*

- To systematically review the evidence on the effectiveness of interventions to combat the challenges of substandard, spurious, falsely labeled, false, and counterfeit drugs (SSFFC).

❑*Introduction*

- The prevalence of SSFFC medications poses a serious and growing threat to millions of people in the global healthcare system as they not only threaten patient health but also prevent attempts to treat illnesses such as chronic and infectious diseases.
- Several techniques for detecting SSFFC drugs differs, including cost, resource usage, sensitivity, specificity, and the capacity to recognize drugs according to their chemical composition.

❑*Method*

- The protocol was registered in PROSPERO: CRD42024598808
- The inclusion factors were based on the recognized PICO (Problem, intervention, comparator, and outcomes) tool. The problem considered for the review included SSFFC drugs.

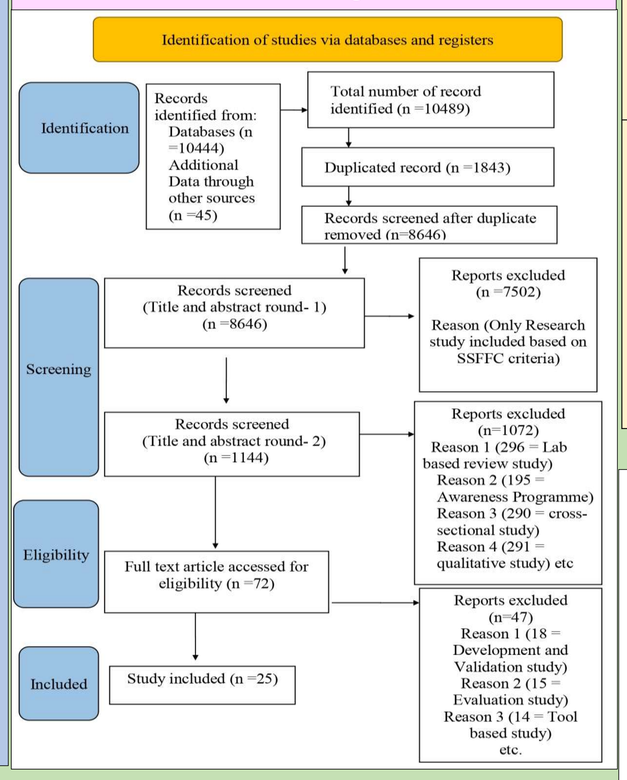


TABLE 1: PRISMA FLOW CHART

INTERVENTION	**National legislation and regulations for drugs** **Awareness programme** **Testing Technology** **Track and trace systems** **Surveillance** **National Alert systems and** **Inspection and quality control of manufacturing unit**

FIG 1: Types of interventions

TEST CATEGORY	DESCRIPTION	TYPES OF TEST	EXAMPLES	COST
Screening	Fundamental quality tests, primarily utilizing chromatographic and spectrometric techniques, along with visual inspection, among other methods	Identification	Visual examinations	N/A
		Assay, disintegration	TLC,HPTLC	Inexpensive
		Assay, disintegration	GPHF MiniLab	Inexpensive
		Identification	RHS	Moderate Cost
		Identification	CD3	Inexpensive
		Identification	DSC	Moderate Cost
		Identification	XRD	Moderate Cost
		Assay, disintegration	NIR spectroscopy	Moderate to expensive
Confirmatory	Methods outlined in the pharmacopeia that are exclusively carried out in a laboratory setting by qualified personnel, with outcomes that are measurable and quantifiable	Assay	HPLC	Highly expensive
		Dissolution	Dissolution	Moderate Cost
		Assay	MS	Highly expensive
		Assay	LC–MS	Highly expensive

TABLE 2: The details of analytical instruments and tests

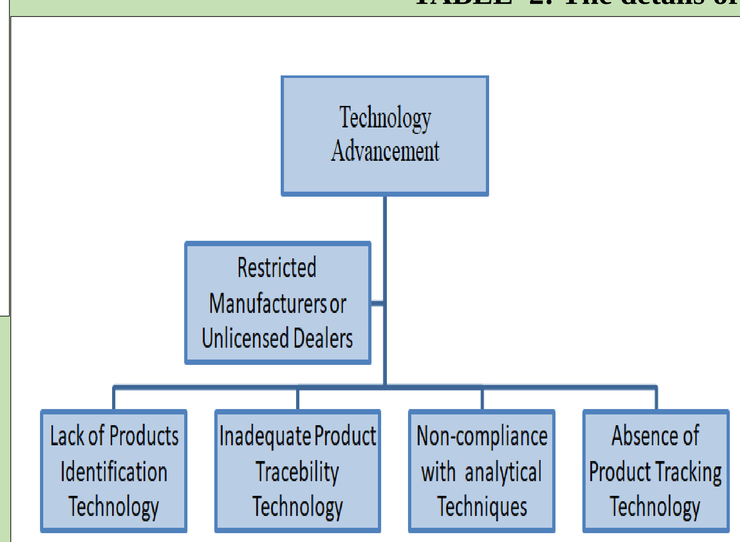


FIG 2A: Challenges of Technology Advancement

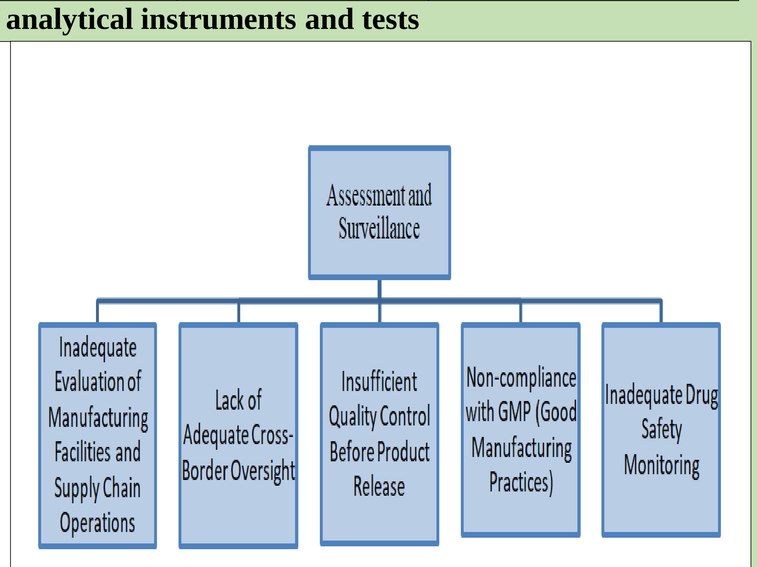
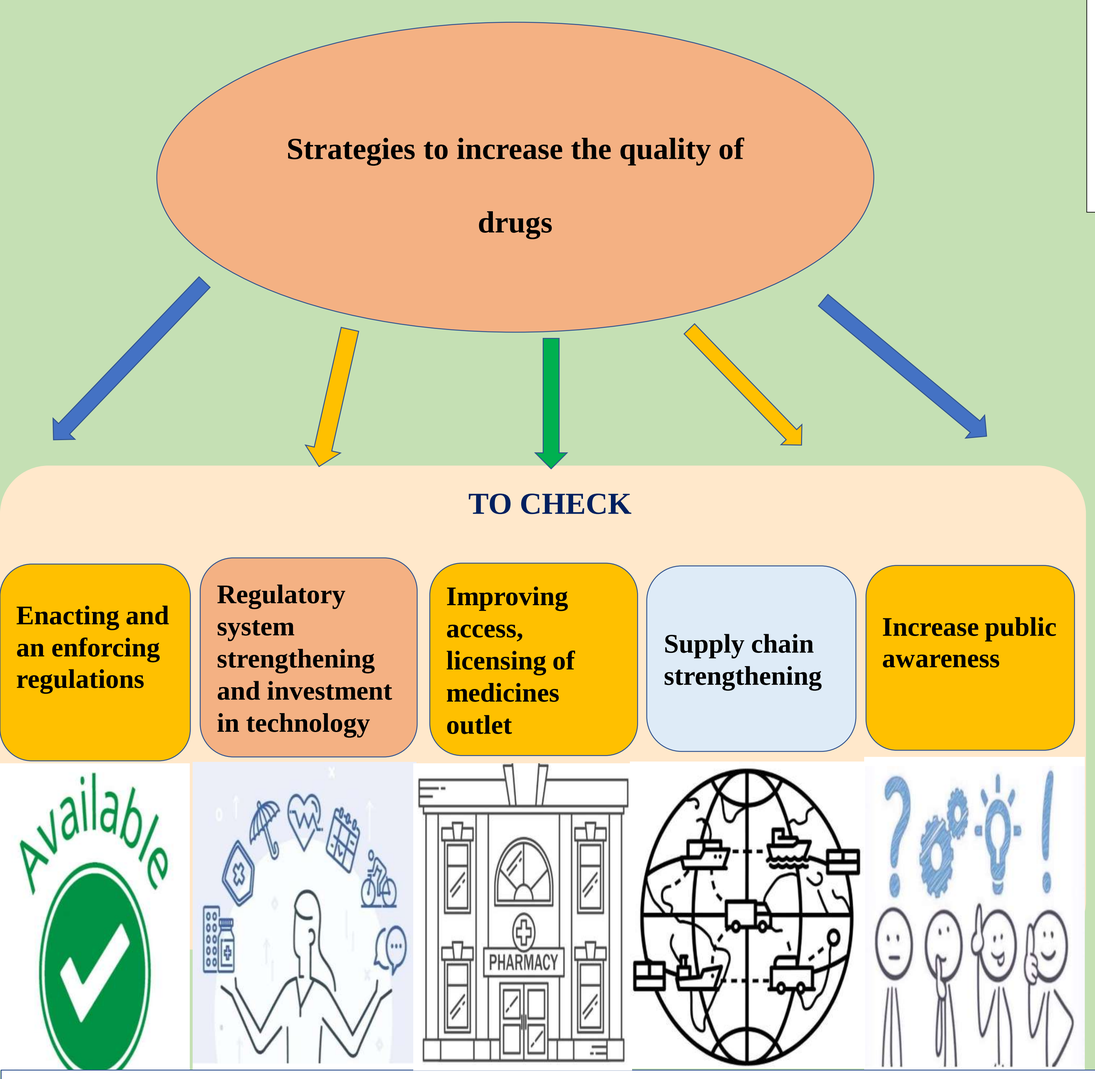


FIG 2B: Challenges of Assessment and Surveillance



❑*Results*

- The majority (84.62%) of them focused on analytical techniques, followed by pharmacosurveillance and product development.
- Analytical studies faced challenges with methods suitable only for crystalline substances, confirmatory test failures due to overlapping spectra and limited applicability to certain drug samples.
- Pharmacosurveillance struggled to track falsified drugs outside official channels, while product development dealt with issues like complex sample preparation and pending of regulatory approvals.
- The cost of materials and the verification procedure are more costly and challenging for end users.

❑*Reference*

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