

1 eTable 1. Showing search strings employed

Search terms	Search engine	Results	Chosen
((glue intoxication OR glue addiction OR glue dependence OR glue sniffing OR glue huffing) AND (SAARC OR Afghanistan OR Bangladesh OR Bhutan OR India OR Maldives OR Nepal OR Pakistan OR Sri Lanka))	Ovid MEDLINE	02	02
Glue intoxication OR glue addiction OR glue dependence OR glue sniffing OR glue huffing AND Afghanistan AND Bangladesh AND Bhutan AND India AND Maldives AND Nepal AND Pakistan AND Sri Lanka	Google scholar	02	01
glue intoxication OR glue addiction OR glue dependence OR glue sniffing OR glue huffing AND SAARC AND Afghanistan AND Bangladesh AND Bhutan AND India AND Maldives AND Nepal AND Pakistan AND Sri Lanka	EBSCOhost (CINAHL Plus)	29	03
((Glue intoxication OR glue addiction OR glue dependence OR glue sniffing OR glue huffing) AND (SAARC OR Afghanistan OR Bangladesh OR Bhutan OR India OR Maldives OR Nepal OR Pakistan OR Sri Lanka))	ProQuest Central	43	05
((Glue intoxication or glue addiction or glue dependence or glue sniffing or glue huffing) and Afghanistan and Bangladesh and Bhutan and India and Maldives and Nepal and Pakistan and Sri Lanka).mp.	PsychInfo	66	04
Glue intoxication OR glue addiction OR glue dependence OR glue sniffing OR glue huffing AND India	IndMED	02	02
((glue intoxication OR glue addiction OR glue dependence OR glue sniffing OR glue huffing) AND (SAARC OR Afghanistan OR Bangladesh OR Bhutan OR India OR Maldives OR Nepal OR Pakistan OR Sri Lanka))	Ovid Embase	04	02
(Glue intoxication OR glue addiction OR glue dependence OR glue sniffing OR glue huffing) AND SAARC AND Afghanistan AND Bangladesh AND Bhutan AND India AND Maldives AND Nepal AND Pakistan AND Sri Lanka	Scopus	01	01
((glue addiction) AND (SAARC)) ((glue addiction) AND Afghanistan)) OR ((glue addiction) AND Bangladesh)) OR ((glue addiction) AND Bhutan)) OR ((glue addiction) AND India)) OR ((glue addiction) AND (Maldives)) OR ((glue addiction) AND (Nepal)) OR ((glue addiction) AND Pakistan)) OR ((glue addiction) AND (Sri Lanka))	Pubmed	04	01
((glue dependence) AND (SAARC)) ((glue dependence) AND Afghanistan)) OR ((glue dependence) AND Bangladesh)) OR ((glue dependence) AND Bhutan)) OR ((glue dependence) AND India)) OR ((glue dependence) AND (Maldives)) OR ((glue dependence) AND (Nepal)) OR ((glue dependence) AND Pakistan)) OR ((glue dependence) AND (Sri Lanka))	Pubmed	02	01
((glue sniffing) AND (SAARC)) ((glue sniffing) AND Afghanistan)) OR ((glue sniffing) AND Bangladesh)) OR ((glue sniffing) AND Bhutan)) OR ((glue sniffing) AND India)) OR ((glue sniffing) AND (Maldives)) OR ((glue sniffing) AND (Nepal)) OR ((glue sniffing) AND Pakistan)) OR ((glue sniffing) AND (Sri Lanka))	Pubmed	36	02

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3	((glue huffing) AND (SAARC)) ((glue huffing) AND Afghanistan)) OR ((glue huffing) AND Bangladesh)) OR ((glue huffing) AND Bhutan)) OR ((glue	Pubmed	02	01
4	huffing) AND India)) OR ((glue huffing) AND (Maldives)) OR ((glue huffing) AND (Nepal)) OR ((glue huffing) AND (Pakistan)) OR ((glue huffing) AND			
5	(Sri Lanka))			
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7	((glue intoxication) AND (SAARC)) ((glue intoxication) AND Afghanistan)) OR ((glue intoxication) AND Bangladesh)) OR ((glue intoxication) AND	Pubmed	01	01
8	Bhutan)) OR ((glue intoxication) AND India)) OR ((glue intoxication) AND (Maldives)) OR ((glue intoxication) AND (Nepal)) OR ((glue intoxication) AND			
9	Pakistan)) OR ((glue intoxication) AND (Sri Lanka))			
10	“Glue intoxication” AND ({SAARC}) OR “Glue intoxication” AND ({Afghanistan}) OR “Glue intoxication” AND ({Bangladesh}) OR “Glue intoxication”	ScienceDirect	34	01
11	AND ({Bhutan}) OR “Glue intoxication” AND ({India}) OR “Glue intoxication” AND ({Maldives}) OR “Glue intoxication” AND ({Nepal}) OR “Glue			
12	intoxication” AND ({Pakistan}) OR “Glue intoxication” AND ({Sri Lanka})			
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14	“Glue dependence” AND ({SAARC}) OR “Glue dependence” AND ({Afghanistan}) OR “Glue dependence” AND ({Bangladesh}) OR “Glue dependence”	ScienceDirect	68	02
15	AND ({Bhutan}) OR “Glue dependence” AND ({India}) OR “Glue dependence” AND ({Maldives}) OR “Glue dependence” AND ({Nepal}) OR “Glue			
16	dependence” AND ({Pakistan}) OR “Glue dependence” AND ({Sri Lanka})			
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18	“Glue sniffing” AND ({SAARC}) OR “Glue sniffing” AND ({Afghanistan}) OR “Glue sniffing” AND ({Bangladesh}) OR “Glue sniffing” AND ({Bhutan})	ScienceDirect	10	01
19	OR “Glue sniffing” AND ({India}) OR “Glue sniffing” AND ({Maldives}) OR “Glue sniffing” AND ({Nepal}) OR “Glue sniffing” AND ({Pakistan}) OR			
20	“Glue sniffing” AND ({Sri Lanka})			
21	“Glue huffing” AND ({SAARC}) OR “Glue huffing” AND ({Afghanistan}) OR “Glue huffing” AND ({Bangladesh}) OR “Glue huffing” AND ({Bhutan})	ScienceDirect	04	0
22	OR “Glue huffing” AND ({India}) OR “Glue huffing” AND ({Maldives}) OR “Glue huffing” AND ({Nepal}) OR “Glue huffing” AND ({Pakistan}) OR			
23	“Glue huffing” AND ({Sri Lanka})			
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25	“Glue intoxication” AND ({SAARC}) OR “Glue intoxication” AND ({Afghanistan}) OR “Glue intoxication” AND ({Bangladesh}) OR “Glue intoxication”	ScienceDirect	34	02
26	AND ({Bhutan}) OR “Glue intoxication” AND ({India}) OR “Glue intoxication” AND ({Maldives}) OR “Glue intoxication” AND ({Nepal}) OR “Glue			
27	intoxication” AND ({Pakistan}) OR “Glue intoxication” AND ({Sri Lanka})			
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4 eTable 2: Summary of the included studies

S. No	First Author, Year	Objective	Study population	Method/Study Type	Summary of findings
1	(Sood and Sood 2009)	To spread awareness among clinicians and practitioners treating children and adolescent identify and work effectively with young people who are abusing or at risk of abusing volatile substances.	16 year-old male, 17-year-old male	Case study	Sudden death is the most serious risk from glue inhalation. Direct modes of toxicity leading to death are anoxia, respiratory depression, vagal stimulation, and cardiac arrhythmias along with trauma, aspiration, and asphyxia from plastic bag use. Acute intoxication from inhalation primarily affects the CNS, causing CNS depression, headache, seizures, ataxia, optic as well as peripheral neuropathy, stupor, and coma.
2	(Mondal 2013)	To study the perception of mental health, mental well-being and help-seeking behaviour.	Street boys living at different Indian railway stations of West Bengal	Editorial	Most of the paltry sum earned is spent on tobacco or on tube of Glue (locally known as ‘Dendrite’ which is an industrial contact adhesive and rubber cement brand marketed as glue sticks, tubes and cans in India and South Asia, mainly in Eastern India, Bangladesh and Bhutan) that is a particular favorite with those children. The findings indicate genetic changes in oral mucosa of street boys in association with tobacco and glue sniffing or huffing habit. Children who abuse inhalants early in life are more likely later to use other illicit drugs.
3	(Mondal, Ghosh et al. 2011)	To examine whether glue sniffing by street children elicits chromosomal and DNA damage in epithelial cells of the oropharynx.	302 street boys	Experimental or quasi-experimental	The findings show genetic changes in oral mucosa of street boys in association with tobacco and glue sniffing or huffing habit.
4	(Jayanth, Hugar et al. 2016)	Report of a case of a 22-year-old male who succumbed to inhaling glue – “Fevibond”	22-year-old male	Case study	The case reported a boy found in an unresponsive state at his residence with a plastic cover around his head and empty tubes of "Fevibond" glue beside him. He died on the way to hospital. At autopsy, conjunctival and visceral congestion were found with pulmonary

					edema and petechiae over visceral pericardium. The viscera were analyzed, and the presence of toluene in his liver and blood was reported.
5	(Mondal, Ghosh et al. 2011)	To examine whether chronic inhalation of glue changes the expression of argyrophilic nucleolar organizer regions (AgNOR), a cytochemical indicator of ribosome biogenesis, in buccal epithelial cells which are present at the line of exposure.	148 Indian street boys	Cross-sectional study	The study found marked increase in the number and area of AgNOR per nucleus in glue addicted boys compared with age- and BMI-matched glue non-addicts and the school boys who were devoid of any habits. Years of addiction to glue showed positive association with AgNOR expression.
6	(Uddin, Sarma et al. 2014)		Children aged 5–12 years, who live and/or work on the streets in Dhaka, the capital city of Bangladesh	Qualitative study.	The deplorable living conditions of street children, with no obvious rights or way out, make them highly vulnerable to HIV/AIDS. Interviews showed that drug-use was common among almost all groups of street-children. Peers introduce them to dandy (glue sniffing) at first but they are gradually exposed to other drugs.
7	(Abdullah, Basharat et al. 2014)	To obtain verbal informed consent from a parent or caregiver.	19 adolescents (10–19 years of age), working on the streets	Qualitative study	Street children are always forced to attain altered social roles because health-related problems, poverty, and large family sizes leave them no choice but to enter the workforce and earn their way. We also gathered information regarding high-risk practices and increased risks of sexual and substance abuse, based on the street children’s increased exposure. A common abusive substance is Samad Bond, a locally manufactured glue that is also used for volatile substance abuse.
8	(Dhawan, Chopra et al. 2015)	To provide a comprehensive understanding on the patterns, correlates of inhalant use and treatment seeking behavior of street children from Delhi, India.	100 inhalant street children below 18 years	Cross-sectional study	The substances most commonly reported were toluene from eraser fluid (by 83.0%), glues (34.0%) and petroleum products (3.0%); mean frequency of use was 9.8 times in a day.

9	(Zakiuddin Ahmad and Memon 2012)	To analyze prevailing delinquency among street children (SC) in Karachi, and challenges posed by it to police and forensic medicine experts.	Street Children aged between 12 – 17 years	Descriptive study	There were 87% street children who were using a variety of substances while 42.2% preferred glue sniffing.
10	(Akoijam, Jamir et al. 2013)	To determine the prevalence and documented inhalant use characteristics among schoolchildren in the Northeast region of India.	Schoolchildren of eighth to eleventh standards	Cross-sectional study	The proportion of students who had ever used inhalants (ever user) was 18.8% and adhesive/glue was the inhalant misused by most of the students.
11	(Asad 2011)	To find out the prevalence of communicable diseases among injecting drug-users in Peshawar	A total of 504 cases of addicts.	Cross-sectional study	Findings revealed that a part from other drugs, glue was initial drug of abuse in 0.5% of the cases.
12	(Dhakal, Joshi et al. 2016)	To study the pattern of health status among child labourer.	25 child labour between 6-14 years (male and female)	Mixed-methods study	Results showed that apart from other substances, 1.85% of the 54 participants sniffed glue and dendrite.
13	(Islam, Kar et al. 2014)	To study some social factors of street children in Guwahati city and to ascertain the substance use behavior of the street children.	215 street children between the ages of 5 and 18 years of Guwahati City Assam	Cross-sectional study	A great majority of the street children was substance users. Out of 174 participants, 152 (87.4%) were in the habit of sniffing glue and this was followed by smoking 147/174 (84.5%).
14	(Iqbal 2008)	To examine the relatively recent emergence of the issue of street children despite its existence through the ages, and to discuss disputes about what the concept circumscribes and	wenty-six cases of street children from Lahore, Pakistan were selected for interview on the basis of purposive sampling	Qualitative study	The absence of a caring environment in the family home can lead young people to seek other forms of satisfaction. Glue sniffing appeared rampant among the street children interviewed. The street children described starting to take drugs by glue sniffing and then proceeding towards using more hardcore drugs. Children start glue sniffing due to peer group pressure in order to show their willingness to accept the intimacy with the prevailing group norms.

		which children should be included.			
15	(Imran, Haider et al. 2011)	To estimate the prevalence and pattern of psychoactive substance use among Medical Undergraduates of two Medical institutions in Lahore (Pakistan).	Total number of students were 1299	Cross-sectional study	Substances used by students in order of preference were cigarettes 175 (78.9%), alcohol 58 (26.2%), cannabis 56 (25.5%), amphetamines 32 (14.6%), Benzodiazepines 6 (3.6%) and glue sniffing 8 (0.4%). This showed that 8 out of 1299 medical students sniffed glue.
16	(Ijaz and Mahmood 2012)	This study aims to elicit by repertory grid technique runaway 18-year old adolescent’s perceptions of significant people around him and his construction of his relationships with them, and the contribution of these constructions to the runaway behavior	An 18-year-old adolescent	Case study	The findings indicate that a young adolescent's decision to run away from home and jump into the world of the unknown is the consequence of certain push factors in the home environment and pull factors in the external world. Participant had tried all sorts of drugs and found Glue sniffing to be his favourite.
17	(Habib, Mumtaz et al. 2010)	To identify the causes of homelessness among children and list the specific health problems of homeless children	100 children	Cross-sectional study	It was disclosed that among the 65% of children who were addicted, 10% were involved in glue sniffing. A sizable proportion of children residing at Edhi Center were indulged in substance abuse. The fact was that children had access to a large variety of intoxicating substance namely ghutka, glue sniffing and cigarette smoking.
18	(Gupta, Nebhinani et al. 2014)	To report the demographic and clinical profile of inhalant users among the treatment seekers at a Drug Deaddiction and Treatment Centre in north India.	The records of treatment seekers at the Drug De-addiction and Treatment Centre, over 10 years (2002-2011) were scanned	Cross-sectional study	The most common inhalant used was typewriter correction fluid (73.6%) followed by typewriter diluent fluid (19.5%) and glue (6.9%). The most common reason for initiation was curiosity. The mean age of onset of inhalant use was 16.3±4.22 yr. Most subjects fulfilled the criteria for inhalant dependence (85.1%). Psychiatric co-morbidity and the family history of substance dependence were present in 26.4 and 32.9 per cent subjects, respectively. Majority of the subjects reported drug related problems, occupation and finance being the worst affected.

			to identify 92 cases reporting inhalant use. Of these 92 cases, the complete record files were available for 87 (94.6%) cases.		
19	(Gigengack 2014)	To better understand inhalant use in India	Six groups in four areas of Delhi, exemplifying six generic categories of inhalant-using street-oriented young people	Qualitative study	Inhalants in India are branded: Eraz-Ex diluter and whitener, manufactured by Kores, are used throughout Delhi; Omni glue in one specific area. There is a general lack of awareness and societal indifference towards inhalant use, with the exception of the inhalant users themselves, who possess practical knowledge. Inhalants are conceptualized as nasha, encapsulating the materiality of the substances and the experiential aspects of intoxication and addiction. The stories of the sensory appeal and the sniffing session reveal that the self-destruction is at the same time also a source of attraction and pleasure.
20	(Nasir and Siddiqui 2012)	To identify those causative factors which push and pull the children out of their home into the street world.	370 street children	Mixed-Methods study	The street children are heavily into substance abuse, glue being the cheapest and the most accessible of all the substances. Almost 141 (39.3%) of the respondents used Glue sniffing. A huge majority of the street children are addicted to different types of substances among smoking and glue sniffing are most famous.
21	(Naik, Gokhe et al. 2011)	To study the demographic profile and substance abuse among street children of Mumbai.	217 street children	Cross-sectional study	Almost 20 (32.8%) boys and 13(37.1) girls admitted that they use glue solution as these substances are cheap and easily available.
22	(Sherman, Plitt et al. 2005)	To compare current, former, and nondrug users regarding their reasons for living on the streets, survival and coping mechanisms, and reasons for drug initiation.	Data from Project Smile registration data on the program’s initial clients (n = 347).	Cross-sectional study	Findings revealed that out of 233 current drug users, 73.4% reported glue sniffing, and of those, 93.0% reported daily glue sniffing. Results showed that glue sniffing and marijuana smoking were the most prevalent drugs of abuse. Glue sniffing is the drug of choice in this sample as well as the majority of Lahore street children, because of its ease of access and inexpensive.



23	(Pagare, Meena et al. 2004)	To estimate the magnitude of and socio-demographic factors related to substance use among street children in Delhi.	115 male street children aged 6 to 16 years	Cross-sectional study	Results showed that inhalant / volatile substance use in the form of sniffing of adhesive glue, petrol, gasoline, thinner and spirit was reported by one fourth of children.
24	(Timsinha, Kar et al. 2011)	To estimate prevalence of drug of abuse.	1500 cases of patients who were above 10 years of age	Cross-sectional study	Almost 6 (0.40%) participants reported glue sniffing as the drug of common use. Glue sniffing was the preferred drug of abuse in participants whose age range was from 14-17. Glue sniffing was found in teen age group.
25	(Singh 2006)			Cross-sectional study	Glue sniffing is a public health problem in our country and resurgence of its popularity in adolescent and young population is a matter of concern for medical community. The easy availability, lack of legal restriction and availability at cheaper rates further impound the severity of this problem. Inhalant abuse can lead to severe damage to the vital organs and affects many systems of the body. Awareness and proper education programme regarding these issues in the glue sniffers, student, teacher, parents and medical professional is required in controlling spread of inhalant abuse.
26	(Upadhyay 2016)	To explore the alterations 'of the street' vagrant kids in Pokhara in stipulations of their access to lifestyle and pecuniary strategies of income sources and predicaments	Vagrant kids	Qualitative study	Drugs that are easily available are glue for sniffing, solvents, marijuana etc.
27	(Thapa, Ghatane et al. 2009)	To identify the physical health problems among the street children of Dharan Municipality, Nepal	Forty eight subjects	Cross-sectional study	Dendrite (glue sniffing) was the only drug used by the respondents in this study.
28	(Towe, ul Hasan et al. 2009)	The study examined HIV risk behaviors and factors associated with exchanging sex	565 registrants, ages 5–19	Cross-sectional study	Drug use was reported by most children. A higher proportion of children who reported exchange sex compared to those who did not identified themselves as ever doing inhaling glue (61.5% vs. 35.4%, $p < .0001$ ) apart from other drugs. This meant out of 229 children



		among male street children in Lahore, Pakistan.			who had exchanged sex, 141 children had ever inhaled glue. Similarly, out of 336 children who did not exchange sex, 119 children had ever inhaled glue.
29	(Sachdeva, Gandhi et al. 2015)	A case of a 16-year-old boy with combined volatile and alcohol abuse; who presented with increasing ataxia, visual and hearing disturbances.	16-year-old adolescent male	Case Study	The study highlights the scenario of increasing combined alcohol abuse and glue sniffing as a growing problem of the time. The child abused glue more than the alcohol due to its easy availability. Also, this case sensitizes physicians to think of substance abuse to be a complex phenomenon.
30	(Sarfaraz and Riaz 2014)	To identify and analyze the problems faced by the street girls in Karachi through this study.	115 girls aged between 10-18 working/living or spending maximum time on the street	Cross-sectional study	The findings revealed that out of 115 girls, almost 3.4% of them used glue. It was also found that these street girls started thinking about their awful lives and started chewing betel, smoking, glue sniffing, took drugs and believed drugs to be the reason of their living. For money or survival, these girls engaged in sexual activities and were susceptible to various sexual transmitted infections, substance use including glue sniffing, illegal drugs and alcohol.
31	(Patra, Mishra et al. 2011)	A two of cases of inhalant abuse: one with an unusual mode of abuse and another with atypical clinical presentation.	A 14-year-old boy, and 21-year-old male	Case study	The second case showed intoxication due to specific glue (dendrite). The patient had presented with generalized muscle weakness and euphoria. The cardiological adverse effect of inhalant noted was in the form of dysrhythmia, i.e., sinus tachycardia. The case detection by means of cross-referral from the Department of Cardiology shows growing awareness and decreased hesitation in seeking psychiatric help.

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eTable 3: PRISMA checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title		Glue sniffing in SAARC region: A Scoping Review and Meta-analysis.	1
ABSTRACT			
Structured summary		<p>Background: Although glue sniffing has been linked with significant morbidity and mortality, it is still under-recognized issue among health care professionals at all levels.</p> <p>Objective: A scoping review was performed to identify the factors and outcomes related to glue sniffing in India, Pakistan, Nepal and Bangladesh.</p> <p>Methods: Ten databases; Ovid MEDLINE, Google scholar, EBSCOhost (CINAHL Plus), ProQuest Central, PsycInfo, IndMED, Ovid Embase, Scopus, Pubmed, and Science Direct were searched without year of publication or language restriction, from their inception to January 2019, using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Of 8951 studies screened, 344 were assessed for eligibility and 31 studies were included using multiple reviewers.</p> <p>Findings: Most of the studies (twenty out of 31) presented prevalence of glue sniffing in comparison with other drugs, nine out of 31 studies explored various factors that lead to glue sniffing or other drugs. Similarly, three studies revealed that glue sniffing was the commonest and most favored drugs amid street children, three studies highlighted that street children earned money or engaged in sex exchange just to ensure that they could buy glue for inhalation, and eight discussed various outcomes related to glue sniffing. Studies from India and Pakistan showed various socio-demographic factors related to high rates of glue sniffing such as, children who were 10 to 15 years old; living on streets/railway platforms/shelter/footpaths/runaways; children with illiteracy, low/primary level of education or school drop-outs, and children having no contact with family. Meta-analysis of proportion for both primary and secondary outcome revealed that the highest incidence of glue sniffing was 57% in India. The overall incidence of tobacco and niswar as well as Cannabis (bhang, charas, ganja) was 83%, and 85% in Pakistan, respectively. The overall incidence of alcoholic beverages and fruit beer was 79% in Nepal. This review reveals significant gaps in the empirical studies, along with a scarcity of data on physical and mental health outcomes associated with glue sniffing.</p> <p>Conclusions: Glue sniffing is the cause of broad range of complications such as biological changes, diseases, financial problems, socio-psychological problems. A variety of factors (i.e. financial, social and psychological) are playing role in prevalence of this phenomenon. The street children from resource-constrained settings have high prevalence of substance use. Glue sniffing is a predominant volatile substance abuse in this population</p>	2
INTRODUCTION			
Rationale	5	Research studies have shown that after marijuana, glue sniffing is the most common volatile substance abuse in individuals whose ages range from 11 to 13 years in England and very few studies have been carried out on inhalant abuse [20]. Likewise, in India, research studies have revealed that abuse of typewriter eraser fluid, composed of toluene, was found common in street children [21, 22]. According to a report of Child Workers, glue sniffing is shown to be increasing at alarming rates among street children in Nepal [23], and none of these street children possessed any knowledge regarding side effects of the drugs they abused. Although the precise number of children indulged in glue sniffing in India, Pakistan, Nepal and Bangladesh is not known, yet it has been seen to be common problem in street children of various countries such as Thailand, Indonesia, Cambodia, Malaysia, Bangladesh, Pakistan, India, Sri Lanka and Philippines [24]. There is an	3

		underestimation of prevalence and public health effects of solvent abuse, inadequate local knowledge related with this phenomenon in general population and health care professionals as well as its association to other risky practices. There have been no prior studies comprising of examining glue sniffing in India, Pakistan, Nepal and Bangladesh. Despite the fact that glue sniffing has been linked with significant morbidity and mortality, it is still under-recognized issue among health care professionals at all levels; particularly in India, Pakistan, Nepal and Bangladesh. Despite the fact that glue sniffing is a grave health problem, medical community also possesses inadequate knowledge related to this phenomenon [25-27]. Therefore, a current review study was planned to highlight the severity of this issue and for fulfilling the gap in the existing literature on glue sniffing in India, Pakistan, Nepal and Bangladesh. This review aims to systematically review studies on glue sniffing in India, Pakistan, Nepal and Bangladesh to find out existing knowledge related with glue sniffing in these countries, various factors that lead to its widespread use and outcomes of glue sniffing.	
Objectives		The current review study was planned to highlight the severity of this issue and for fulfilling the gaps in the existing literature on glue sniffing in India, Pakistan, Nepal and Bangladesh. The primary outcome was the proportion of overall glue sniffing as well as comparison of incidence of glue sniffing in India, Pakistan, Nepal and Bangladesh. This review aims to systematically review studies on glue sniffing in India, Pakistan, Nepal and Bangladesh to find out existing knowledge related with glue sniffing in these countries, various factors that lead to its widespread use and outcomes of glue sniffing).	4
METHODS			
Protocol and registration	6	N/A	
Eligibility criteria	5, 6	For this review, research studies based on all study designs were eligible including the studies that employed qualitative or quantitative methods, methodology or guideline reports. Studies included in this review were based on following research designs: qualitative, quantitative, case studies, mixed-methods and descriptive studies. Moreover, reviews, letters, short reports or editorial papers were also included. No restriction was made on the year of publication of studies. Only research studies in English language were considered.	5,6
Information sources	30	A comprehensive, electronic search was conducted till January 2019 using Ovid MEDLINE, Google scholar, EBSCOhost (CINAHL Plus), ProQuest Central, PsycInfo, IndMED, Ovid Embase, Scopus, Pubmed, and ScienceDirect.	5
Search	6, 7	Please see Table Supplementary 1: Search Strategy	33
Study selection	5, 6	Identification, screening of titles and abstracts, full text eligibility assessment, included in scoping review.	5
Data collection process	5, 6	The literature was obtained via Ovid MEDLINE, Google scholar, EBSCOhost (CINAHL Plus), ProQuest Central, PsycInfo, IndMED, Ovid Embase, Scopus, Pubmed, and ScienceDirect databases.	6
Data items	7	The literature relating to glue sniffing in India, Pakistan, Nepal and Bangladesh to find out existing knowledge related with glue sniffing in India, Pakistan, Nepal and Bangladesh, various factors that lead to its widespread use and outcomes of glue sniffing till January 2019 was included in this study	6
Risk of bias in individual studies		It was not conducted in this review as this review comprised cross-sectional studies, qualitative studies, case studies, mixed-methods studies, experimental or quasi-experimental study, descriptive study, and editorials.	7
Summary measures		Analysis of proportion was carried out for both primary and secondary outcome using Stata version 14.3. Where applicable subgroup analysis was carried out to further get a better understanding for the primary and secondary	7

		outcomes	
Synthesis of results	1	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I <sup>2</sup> ) for each meta-analysis.	12
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	12

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RESULTS			
Study selection	17	<div><div><div>Identification</div><div>Screening</div><div>Eligibility</div><div>Included</div></div><div><div>Articles identified through database searching (n = 11780)</div><div>Duplicates (n = 2829)</div><div>Articles after duplicates removed (n = 8951)</div><div>Articles screened (n = 8951)</div><div>Articles excluded (n = 8607) due to: Not relevant to specific country (n=5178) Not relevant to the topic (n=3429)</div><div>Full-text articles assessed for eligibility (n = 344)</div><div>Full-text articles excluded with reasons (n = 313)</div><div>Articles included in review (n = 31)</div></div></div>	5
Study characteristics	18	<b>Please see eTable 2: Summary of the included studies</b>	36
Risk of bias within studies	19	Not applicable	
Results of individual studies	20	Not applicable	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	7-18
Risk of bias across studies	22	Not applicable	
Additional analysis	23	Not applicable	
DISCUSSION			
Summary of evidence	24	This scoping review has brought forth the role of glue sniffing and the negative effects it has on the lives of those who sniff glue, in general, and street children in particular. This review has also shown that glue sniffing can also lead to or add to physical and mental health problems. The factors involved in glue sniffing especially amongst street children of India, Pakistan, Nepal and Bangladesh are complex and helping the children who indulge in this behavior presents a challenge to health care professionals and social service providers. Regardless of high prevalence of glue sniffing, co-occurrence with other forms of inhalant abuse and substance abuse in lives of street children, preventive strategies, awareness campaigns and evidence-based practices for dealing with these multifaceted issues are still in their infancy. Though the present review has shown an increase in	13-18



		<p>recognition among health care providers, researchers, policy makers and social workers regarding severity of this problem, there is a lack of actual and extensive recommendations to expand practices in individuals who sniff glue. Recognizing the challenges street children who experience co-occurring glue sniffing, substance abuse, inhalants abuse and/or various other problems encounter in living their lives, few recommendations were suggested. The most recurrent recommendations focused on the need to increase awareness, adequate education, and sensitizing the physicians, students, teachers, parents and medical professionals regarding severity and complexity of this wide spreading problem [50, 59].</p> <p>Of the 31 studies included in this review, most of the research studies examined glue sniffing in India (n=15), followed by Pakistan (n=11). These studies highlighted various socio-demographic factors associated with glue sniffing and inhalant abuse, such as: living on streets/railway platforms/shelter/footpaths/runaways [32-34, 38, 42-45, 48, 49, 51-53, 57, 58, 61]; illiteracy, low/primary level of education or school drop-outs [32, 36, 38, 40, 42, 43, 48, 49, 51, 52, 57, 58]; low socioeconomic status [32, 38, 40-42, 44, 51, 52, 55, 57-59]; age of 10 to 15 years [32-35, 38, 42-45, 49, 51, 57, 58]; no contact with family [33, 36, 38, 45, 53]; male gender [32, 33, 35, 38, 39, 41, 43-45, 48, 51, 59], and family history of substance abuse/dependence [33, 38, 41, 44, 45, 51, 52, 57, 59].</p> <p>Overall, an analysis of the N=31 records included in this review revealed variety of factors that were playing a role in widespread huffing to glues in streets, especially extremely low price; easiest accessibility and lack of legal restriction were reported to be the most recurrent factors [40-42, 50]. In addition, glue sniffing was reported as the most frequent, prevalent and favored form of inhalant abuse among school children, college going adolescents, adults, and street children in various studies [31-34, 46, 52]. Research studies highlighted grave outcomes of glue sniffing ranging from sudden death to detrimental effects on the vital organs; and from genetic changes to damaging effects on the occupational functioning of individuals [17, 41, 50, 55-58, 61]. Various research studies have presented similar detrimental effects of glue sniffing [10-13]. .</p>	
Limitations	25	<p>Before interpreting the results, following limitations should be kept in mind. First, the studies included had heterogeneous methodologies and diversity of instruments used to explore similar aims. This has increased difficulty in concluding the findings. Second, although there has been a considerable increase in number of research studies on glue sniffing in India, Pakistan, Nepal and Bangladesh, the results can't be generalized to all the countries as well as to a worldwide level due to the geographic location of the studies, restricted to a few countries and individuals. Third, "gray literature," or unpublished works were excluded from the present review. This literature might have given insights regarding phenomenon of glue sniffing in those countries as unpublished works are seldom given due consideration. Fourth, there were no longitudinal studies to allow an appraisal of the efficacy programs launched to deal with glue sniffing. Fifth, the local text published in local languages of various geographical regions was not included in this review due to lack of financial support to translate and interpret their results accordingly.</p>	18
Conclusions	26	<p>Individuals, especially street children, indulging in glue sniffing have complex needs and are exposed to multifaceted factors; the relationships among these factors are complex, multidimensional, and bidirectional. Despite the fact that the association between the street children's inhalant use and health outcomes should be investigated, we hypothesize on the basis of our findings that due to the inhalant use, street children are at higher risk of poor health outcomes. This review has identified key issues requiring urgent public health action. It is evident that there is a need to educate masses and aware policy makers to impose legal restrictions in order to help those working on the frontlines for answering the needs adequately, efficiently, and sympathetically. However, the findings from research explorations to assist preventive strategies are nascent with very few actual recommendations to guide the government and policy makers in controlling inhalants' availability and access on streets. The prevalent use of inhalants is especially alarming due to legal availability and unrestricted sales to minors, as</p>	19

		well as damaging health effects, and should be a main concern for law and policymakers. In order to cater the learning needs of those individuals working with street children of India, Pakistan, Nepal and Bangladesh, there is a need of collective, cross-sectorial, and multidisciplinary collaboration and methodical assessment of new education and awareness initiatives.	
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