

# Small/kiddie Cigarette Packaging Size and Its Impact on Smoking: A Systematic Review

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## Research

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# Abstract

**Background:**Kiddie/small packs contain less than 20 cigarette sticks in a pack.Kiddie packs were introduced by the tobacco industry to support moderation and encourage quit smoking among heavy smokers although this may in turn encourage underage smoking. Smaller packs may suggest lower costs and this may increase affordability among the younger generation. This concern has caused many countries to ban the sale of single cigarette sticks or kiddie packs. Hence, a systematic review was conducted to identify the impact of kiddie packs on smoking as compared to regular cigarette packaging in the general population.

**Methods:**A database search was conducted in PubMed, EMBASE, CENTRAL, Web of Science and Scopus up to 31<sup>st</sup> January 2020. Other sources namely Google Scholar, as well as Journal of Substance Use and Tobacco Control were also searched. The results were analysed qualitatively, under four groups: initiation of smoking; urge /tendency to buy cigarettes; prevalence of smoking and attempt to reduce cigarette consumption. The methodological quality of all articles that were included was determined using a validated 16-item quality assessment tool (QATSDD). The literature search identified 2253 articles, of which 20 articles had met the inclusion criteria.

**Discussion:**Articles that we reviewed had some evidence that kiddie packs increase the urge/tendency to buy cigarettes and also increase the attempt to reduce cigarette consumption. However, we found no evidence on the impact of kiddie packs on the initiation of smoking and the prevalence of smoking. The average quality score for all papers was 34.1%. Given the diverse study settings of the articles and despite the challenges of the methodological quality of some papers, this review will provide evidence that kiddie packs increase urge/tendency to buy cigarettes and also increase the attempt to reduce cigarette consumption. However, since most studies were of low quality, further high-quality studies are needed to come to a firm conclusion of the impact of kiddie packs on smoking.

**Systematic review registration:** PROSPERO CRD42018102325

## Background

In the year 2015, over 1.1 billion people smoked tobacco globally [1]. About six million people per year died (prematurely) due to tobacco use (smoked and smokeless) according to World Health Organisation [2]. Smoked tobacco includes manufactured cigarette, kretek and hand-rolled cigarette and smokeless include snuff tobacco, electronic cigarette and chew tobacco [2].

There are many ways cigarettes being sold such as in tins, cartons, packs, "kiddie" packs and as loose sticks [3]. Kiddie packs consist less than 20 cigarette sticks per pack [4]. It is sold in packages of 5, 10 or 15 cigarette sticks in many countries [5]. Kiddie packs are also known as 'mini packs' or 'small packs' [6].

According to the British American Tobacco (2006) [7], kiddie packs may encourage underage smoking but it supports moderation and encourages smoking cessation among heavy smokers. On the contrary, the affordability of kiddie packs would encourage smoking among the lower income groups, mainly teens and minors [3]. This would demean efforts in combating tobacco consumption as various studies have shown that tobacco consumption dropped in response to higher prices [8-10]. In Indonesia, based on the 2014 Global Youth Tobacco Survey (GYTS), three out of five Indonesian students aged between 13 and 15 could buy cigarettes easily [11]. This finding was supported by another study conducted in Denpasar, Bali, which showed that more than half of retailers sold cigarettes in single sticks and its buyers were mostly young people as it is within their buying capacity compared to buying a whole cigarette pack [12]. Besides Indonesia, Philippines and Thailand also allowed cigarettes to be sold in single sticks and kiddie packs, thus make it easily accessible and attractive to teens and minors [13].

Based on the above stated points, the World Health Organisation (WHO) Framework Convention on Tobacco Control (FCTC) recommends countries to eliminate the sale of kiddie packs and single sticks. In addition, Article 16.3 of the WHO's Framework Convention on Tobacco Control (FCTC) [14] states that comprehensive policies and effective enforcement strategies are required to stop the sale of single stick cigarettes and kiddie packs. In 2012, 84 countries (of the FCTC) had policies in place to prevent the sale of single stick cigarettes or kiddie packs [15].

The government of South Australia was the first in the world to establish a ban on kiddie packs back in 1986 [16] followed by Canada in 1994 [17]. In Asia, Singapore (2002), Brunei (2005), Laos (2009), Malaysia (2010), Cambodia (2015), and Vietnam (2016) had banned kiddie packs from the market as a measure to prevent teens from smoking [18]. Even with the enforcement of the ban, the tobacco industry has tried to reintroduce kiddie packs citing reducing contraband cigarette use as a reason [19].

An evidence-based review of the impact of kiddie cigarette packs on smoking is needed in order to provide reliable evidence to assist policymakers and stakeholders to formulate new policies and strengthen existing strategies which would assist in introducing a ban eventually. To our knowledge, there is no published systematic review that addresses our questions, (1) What is the impact of kiddie packs on initiation in the general population? (2) What is the impact of kiddie packs on urge/tendency to buy cigarette in the general population? (3) What is the impact of kiddie packs on attempt to reduce cigarette consumption among current smokers? (4) What is the prevalence of smoking kiddie packs among current smokers? Therefore, this review was conducted to identify the impacts of kiddie packs on the initiation of smoking and

urge/tendency to buy cigarettes in the general population, and attempt to reduce cigarette consumption and prevalence of smoking kiddie packs among current smokers.

## Methods/design

### Research objective

The aim of this review is to identify the effects of kiddie packs on smoking as compared to regular cigarette packaging. The objectives are:

1. To identify the impact of kiddie packs specifically on the initiation of smoking, urge/ tendency to buy cigarettes in the general population
2. To identify the impact of kiddie packs on attempt to reduce cigarette consumption among current smokers
3. To determine the prevalence of smoking using kiddie packs among current smokers

We conducted a systematic review based on our published protocol [20]. We followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines in conducting and reporting the results of this systematic review (see Additional file 1: PRISMA 2009 Checklist).

### Inclusion/ exclusion criteria

### Study design

Based on our protocol, we planned to include all studies (randomised controlled trials, quasi experimental and experimental studies), observational cross sectional, case-control and cohort studies in this review and exclude guidelines, conference papers, any commentaries, editorials or opinion pieces. However, after data extraction, we only found three cross-sectional studies for inclusion in this review. Hence, we made a post-hoc decision to include other types of observational studies namely qualitative analysis and hypothetical modelling that addressed the same type of intervention and outcome. Studies written in the any language and all original articles published without restriction on the publication dates were included in this review.

We included population at large that have the urge / tendency to buy kiddie packs and attempts to reduce cigarette consumption

### Operational Definition

Initiation of smoking was defined as when an individual first smoked a whole cigarette [21]. It is also meant a changing status from a non-smoker to a smoker [22]. Urge/ tendency to buy is defined as a sudden, powerful and persistent urge experienced by a consumer to buy something immediately. The tobacco industry views cigarette package size in a combination with retail displays as a contributor to impulse sales [4]. Reduced cigarette consumption was defined as reducing the number of cigarettes smoked each day. It is a common strategy used by smokers to move towards smoking cessation, to reduce harm or for saving money [23].

### Search strategy

We conducted a systematic literature search to identify all published and unpublished studies that could be considered eligible for inclusion in this review. We used terms such as "cigarette" and "mini pack" OR "kiddie packs" OR "small packs" and "Smoking initiation" OR "impulse to buy" OR "urge to buy" OR "tendency to buy" OR "smoking reduction" as a basis for keyword search. A detailed keyword search is depicted in Table 1. The literature search identified potential studies in all languages. We searched five databases including PubMed, EMBASE, The Cochrane Central Register of Controlled Trials (CENTRAL), Web of Science and Scopus up to 30th January 2020. Additional records were identified through other sources: Google Scholar, as well as Journal of Substance Use and Tobacco Control. Truth Tobacco Industry Documents were obtained from the reference lists of the literature scanned. Truth Tobacco Industry Documents (TTIDs) contain millions of tobacco industry documents which are publicly available. This is to understand tobacco companies' rationales of introducing new package quantities and research regarding how kiddie packs may influence consumer behaviour.

Table 1  
Search terms used. Contains search terms used for database literature search

Key search strategy	Search date
<p><b>The databases include Pubmed, Scopus, Web of Science, The Cochrane Central Register of Controlled Trials(CENTRAL) and EMBASE.</b></p> <p><b>Keywords for Pubmed, Cochrane and EMBASE:</b></p> <p>((("Manufactured cigarette" OR "Manufactured cigarettes" OR smoking OR Smoke OR tobacco OR cigarette OR cigarettes)) AND (pack* OR kiddie OR "mini" OR "Small packet" OR "Small packets" OR "Small package" OR "Small packages" OR "Kiddie pack" OR "Kiddie packs" OR "Kiddie packet" OR "Kiddie packets" OR "Kiddie package" OR "Kiddie packages" OR "Small box" OR "Kiddie box" OR "mini pack" OR "mini packs") AND (("Smoking initiation" OR "impulse to buy" OR "urge to buy" OR "tendency to buy" OR "smoking reduction")))</p> <p><b>Keywords for Web of Science:</b></p> <p>("Manufactured cigarette" OR "Manufactured cigarettes" OR smoking OR Smoke OR tobacco OR cigarette OR cigarettes) AND (pack* OR kiddie OR "mini" OR "Small packet" OR "Small packets" OR "Small package" OR "Small packages" OR "Kiddie pack" OR "Kiddie packs" OR "Kiddie packet" OR "Kiddie packets" OR "Kiddie package" OR "Kiddie packages" OR "Small box" OR "Kiddie box" OR "mini pack" OR "mini packs") AND (("Smoking initiation" OR "impulse to buy" OR "urge to buy" OR "tendency to buy" OR "smoking reduction"))</p> <p><b>Keywords for Scopus:</b></p> <p>("Manufactured cigarette" OR "Manufactured cigarettes" OR smoking OR smoke OR tobacco OR cigarette OR cigarettes) AND (pack* OR kiddie OR "mini" OR "Small packet" OR "Small packets" OR "Small package" OR "Small packages" OR "Kiddie pack" OR "Kiddie packs" OR "Kiddie packet" OR "Kiddie packets" OR "Kiddie package" OR "Kiddie packages" OR "Small box" OR "Kiddie box" OR "mini pack" OR "mini packs") AND ("Smoking initiation" OR "impulse to buy" OR "urge to buy" OR "tendency to buy" OR "smoking reduction")</p>	<p>From 6<sup>th</sup> June 2018 up to 30<sup>th</sup> January 2020</p>

We retrieved and reviewed all full-texts of potentially relevant articles if the title or first few pages contained information about research on kiddie packs or stated a reason for choosing kiddie packs.

## Study selection

During the search of relevant papers for inclusion in the review, a total of 3869 potential papers were identified and 2253 articles were obtained after removal of duplicates. Three pairs of reviewers (WS&MY, N&A, TA&TG) independently screened the titles and abstracts according to the inclusion and exclusion criteria. Any disagreements were resolved through discussion with a third author (H). After the titles and abstracts were screened, a total of 27 full text articles were retrieved and 19 additional articles were identified via cross references. Three pairs of reviewers independently reviewed full text of these additional articles. Any disagreements were resolved through discussion or referred to the third author as referee (MF). Of these, twenty articles met the inclusion criteria for this review. A detailed description of the process is described in Figure 1.

## Data extraction

Data extraction and analysis were carried out by two independent pairs of reviewers (H&MY, TA&TG). Two pairs of reviewers independently extracted data using a standardized data extraction form containing information of the authors, year of publication, place of study, study design, number of respondents, type of packaging, outcome and the 16-item quality assessment tool (QATSDD) score (Table 3). The first independent pair of reviewers (H&MY) assessed the relevance of the articles that met the inclusion criteria and these full texts were later checked by the second independent pair of reviewers (TA &TG). Each article was grouped under the four main themes, which were initiation of smoking, urge/tendency to buy cigarettes, prevalence of smoking (using kiddie packs) and attempt to reduce cigarette consumption among the population.

## Assessing the study methodological quality and bias

The included studies are diverse in terms of study designs, data collection methods, types of data and analytical methods used. Due to this, we decided to use QATSDD compared to ROBINS-I, Rob2 as stated as options for risk of bias of assessment in our protocol. It is a validated tool developed by Sirriyeh et al. [24] and it was used by other studies such as Vyth et al. [25], Hughes et al. [26] and Adam & Jensen [27].

The tool consists of 16 criteria (14 of these criteria apply to qualitative studies, 14 apply to quantitative studies and all 16 apply to any mixed methods papers), each with a score ranging between 0 and 3, with 3 being the best. The maximum score for mixed papers is 48 and 42 for qualitative or quantitative. Aspects of clarity were reflected in description of aims and setting, data quality, method of analysis and self-evaluation. The fulfilment of 16 criteria was assessed by two independent pairs of reviewers for each publication, based on the information provided in the assessed full texts and a score corresponding to the level of satisfactory attainment of the criteria as outlined by QATSDD tools.

For each full text, the scores were added and divided by the maximum possible score to report the paper's overall quality score. A score of 0 was given if authors have not included the level of details required to make a judgement for quality criteria.

## Results

A formal meta-analysis was not possible due to the heterogeneous nature of study settings, designs and outcome measures. We were unable to pool similar studies with the same category of population, exposure, comparison and outcome. Therefore, studies with a similar themed component were grouped together for narrative synthesis.

## Characteristics of the included studies

During the search of relevant papers for inclusion in the review, a total of 3434 potential papers were identified after duplications were removed. After going through the titles and abstracts, a total of 27 papers were selected for further screening. Of these, 20 articles met the inclusion criteria.

Some studies were designed to detect the actual or potential impact of kiddie packs compared to regular cigarette packs. All studies looked at the actual or potential impact of kiddie packs on the urge /tendency to buy cigarettes. Some studies looked at the impact of kiddie packs in regulating cigarette consumption. No studies included in the review were able to investigate the impact of kiddie packs on initiation of smoking and the prevalence of smoking. Table 2 presents a summary of the findings. Data on study type, data collection and analysis were summarised for studies that met the inclusion criteria. The last column of Table 2 summarises the results of the methodological quality (presented as a percentage of the maximum possible score)

Table 2  
Summary findings

Study	Study type	Sample size	Intervention (Size of packaging)	Population	Outcome	QATSDD Score	Sponsorship status by tobacco company
Marti & Sindelar (2015)	Computer-based online survey	N=868 (survey)  N=593 (focus group)	standard (20 units), smaller (10 units), and larger (30 units) packs	· recruited from the Yale School of Management eLab (elab.som.edu), USA  · sample was restricted to those who correctly answered a quality-control question	· About one third of current smokers would be interested in buying a smaller pack of 10 cigarettes and that most of them reported <b>consumption regulation as their main reason for choosing a smaller pack.</b> (attempt to reduce cigarette consumption), followed by <b>price</b> and convenience (urge to buy cigarettes)  · These smokers are willing to pay a premium for the relatively smaller pack, which is consistent with a demand for a pre-commitment device.  · Results from regression models show that preferences for pack sizes match current consumption of cigarettes.  · However, smokers who are interested in quitting and who have a higher degree of self-control have a preference for smaller packs.  · <b>No empirical evidence on whether smaller pack are attractive to young adults.</b>	71%	Not sponsored by a tobacco company
Farrell, Fry & Harris (2011)	Hypothetical modelling count data processes	N=5766	5,10,15 and 20 cigarettes per weekdays	Adults aged 16-74 years living in England	-This article hypothesized the importance of pack sizes on cigarette consumption in a given period based on data of the Health Education Monitoring Survey (HEMS) 1998  -Smokers <b>regulate their consumption in accordance with the size of packets that are available.</b> (attempt to reduce cigarette consumption).	74%	Not sponsored by a tobacco company

					<p>-The estimation results suggest that the (expected) number of cigarettes smoked by a typical smoker is 10 per day – equivalent to the amount contained in the smallest packet that consumers can purchase in England.</p> <p>-The results suggested <b>government to allow cigarettes to be sold in smaller packs to reduce cigarette consumption.</b></p>		
Wilson et al. (1987)	Cross-sectional study	<p>N=567 adolescent</p> <p>N=500 adults</p>	Packets of 15	<p>Adolescents aged 14 and 15, Adelaide, Australia</p>	<ul style="list-style-type: none"> <li>Conducted in the Adelaide metropolitan area</li> <li>56.3% among adolescent smokers had purchased packets of 15 in the month prior to the survey vs 8.8% among adult smokers</li> <li>Price and concealment were known to be important purchasing factors (urge/ tendency to buy cigarettes) among adolescents..</li> </ul>	50%	Not sponsored by a tobacco company
Levy J & Wood M. (1995)	Qualitative study (In-depth interview)	N=20	Packet of 10	Adults aged 21-29 year old, a specific brand smokers, New York, USA	<ul style="list-style-type: none"> <li><b>A number of smokers said they would buy 10's (urge/ tendency to buy cigarettes)</b> instead of traditional packs</li> <li><b>Purchase interest</b> was driven by: <ul style="list-style-type: none"> <li>Expected lower price</li> <li>Compactness of the pack</li> <li>Uniqueness of the products</li> </ul> </li> </ul>	31%	Sponsored by a tobacco company
Study	Study type	Sample size	Intervention (Size of packaging)	Population	Outcome	QATSDD Score	Sponsorship status by tobacco company
Lopez (1992)	Qualitative study- (one-on-one interviews)	N=36	Packet of 10's	Smokers of a specific brand and competitive smokers-	<ul style="list-style-type: none"> <li>Women were motivated to purchase 10's pack as the pack was seen as more</li> </ul>	21%	Sponsored by a tobacco company

				women, in Orlando, FL	discreet, cute and easy to fit into places like purses or pockets. <b>(tendency/urge to buy)</b>		
				· White and African-American			
				· Ages of 18-40			
Wolf (1993)	Qualitative, twelve triads	N=12 triads, conducted August 11-12, 1993	Special Packet of 10's	Adults ages 25-44 in Chicago, IL, smoke non-menthol, full flavor or lights, kings or 100's	<b>(tendency/urge to buy)</b> · Low price-as the way to experiment with a new brand · Stylish look · Easier to carry · More discreet · Reduce cigarette consumption	21%	Sponsored by a tobacco company
Gomez & Guevara (1993)	Cross sectional study(Consumer Research Report) interview	N=1000,	14's pack users	Male and female smokers who claimed to smoke at least 5 cigarettes per day, in Puerto Rico	· Usage of 10 packs declined significantly since 1992 from 11.1 to 7.9%. This happened in the San Juan region and among smokers under 35 years of age · However, share for the 14's pack was high (21%)- continues to skew to males and 18-24 year olds · Primary reasons for 10's and 14's pack size preference were( <b>Urge to buy/urge/ tendency to buy cigarettes</b> ) o Cost (more economical /cheaper) o One smokes less with smaller pack size	17%	
Curtis J. G. (1985)	Beta qualitative research	N=43 uniFocus interviews, Pittsburg, Pennsylvania on May 8 and 9, 1985.  N=10/43 in a group	10's pack and 25's pack cigarette	Women, aged between 18 to 24, at least 4 pack of cigarettes per week.	· The women were shown visuals and alternative package configurations, probed for imagery and opinions.  · Preference for 10 pack were due to	26%	sponsored by a tobacco company



discussion, 9  
May 1985

2 factors (1)  
consumption, and  
(2) style. (**urge to  
buy and reduce  
cigarette  
consumption**)

· Reason for  
preference 10's pack  
compared to 25's  
pack were:

- o A stylish look
- o Ease of carrying
- o Lower price
- o Help to cutting  
down smoking
- o Trial/sample  
pack
- o Disadvantages

§ A heavy smoker  
would have to make  
several trips to the  
stores

· Reasons for  
25's pack

- o Convenience
- o Extra cigarettes  
that could act as  
cushion and value
- o Disadvantages:

§ Bulkiness

§ Too many  
cigarettes for a light  
smoker

Carter SH,  
1986

Qualitative study

N=8 focus  
group  
discussion

12's pack  
cigarette

Philadelphia

Group 1:  
females, aged  
18-24, N=10

Group 2: males,  
aged 18-24, N=8

Group 3:  
females, aged  
26-35, N=8

Group 4: males,  
aged 26-35, N=7

Columbia

Group 1:  
females, aged  
18-24, N=10

Group 2: males,  
aged 18-24,  
N=10

Group 3:  
females, aged  
31-50, N=9

Group 4: males,  
aged 31-50, N=8

· Cut down  
smoking (**Reduce  
cigarette  
consumption**)

- Convenience
- Unique
- Overall  
appearance
- Less price

36%

Warner PA Assoc, 1990	Qualitative study	N=6 focus group 3 in Chicago 3 in Atlanta	10's pack	Black adult smokers ages 18 to 24, in Chicago and Atlanta,  smoke 5 or more cigarettes per day  Not attended college  <\$20000 annual household income  - -	<ul style="list-style-type: none"> <li>· 10's pack is the best alternative for occasional smokers</li> <li>· Most likely to be selected by heavy smokers when they are: <ul style="list-style-type: none"> <li>o low on pocket funds</li> <li>o going out to a club or party where the 10-pack is more convenient to carry in a pocket or small purse</li> </ul> </li> </ul>	33%	sponsored by a tobacco company
Gomez & Morales (1996)	Qualitative study -Island Tracking Study May 1996	N=1000 , random interviews among smokers	10's, 14's and 20's pack	Male and female smokers, 18 to 65 years old in Puerto Rico, smoke at least 5 cigarettes a day	<ul style="list-style-type: none"> <li>· Reasons for 10's and 14's pack (top 3) <ul style="list-style-type: none"> <li>o More economical/cheaper</li> <li>o Smoke less</li> <li>o Easier to carry/store</li> </ul> </li> </ul>	55%	sponsored by a tobacco company
Burke Marketing Research. Package size evaluation study(1983)	Qualitative study	N=396	10, 12, 25 and carton of 5 packs	Male and female smokers in mall in US,  21 years and above	<ul style="list-style-type: none"> <li>· Favourite package size is 20, alternative is 25 per package</li> <li>· <b>25's is preferable over 10's or 12's</b> on measure of purchase intent and most likely to buy</li> <li>· Reasons for 10's pack and 12's pack cigarette: <ul style="list-style-type: none"> <li>o Convenient of package size</li> <li>o Small</li> <li>o Easy to carry</li> <li>o Reduce cigarette consumption</li> <li>o Limit/ cut down on smoking (12%)</li> </ul> </li> <li>· 33% of smokers gave positive purchase intent for the 12 count size and 25% for 10 count size</li> </ul>	45%	sponsored by a tobacco company
Generation Idea.( 1982)	Qualitative study, Semi-rigid package study. A qualitative exploration of consumer reactions to a new type of packaging for cigarettes.	N=4 focus groups	12's pack	Panellist of Smokers  · Different segment of smokers by brand of cigarette smoked and by the type of	<p><b>Tendency /urge to buy</b></p> <ul style="list-style-type: none"> <li>· Small size pack is cute but holds too few cig (easy to lose)</li> <li>· smaller package only</li> </ul>	17%	sponsored by a tobacco company

				packaging preferred  In Atlanta, USA	appropriate for the social smoker  · good for evening use (fit better into the evening bag/ provide just enough for smoking after dinner)  · Affordable		
Paul A. Warner Assoc. (1990)	Qualitative study	4 focus group session	10 packs and 20 packs	Smokers in Cleveland, Ohio	<b>Tendency/urge to buy</b> · most respondents admit that they have never wished that cigarettes were available in package sizes other than the standard 20's, and prefer larger pack · 10 pack reaction: o this size would be helpful to people who are trying to cut down or quit smoking o easy to carry o cannot share with others-easier to remove the cigarettes o easy to fit into a purse/pocket	26%	sponsored by a tobacco company
Market Research Document, (1991)	Segmentation – Phase I – Focus Group Research – Ontario/ Quebec	N=116	with 15-, 20-, and 25-packs.	Canadian smokers, Canada	Reason for 15's pack: · beneficial to those with the least money (youth, beginner smokers, the poor) and was frequently referred to as the 'poverty pack,' with people admitting to having purchased 15's "with a self-conscious and self-deprecating laugh." ( <b>urge to buy</b> ) · associated with those who were attempting to quit smoking "through gradually cutting down." ( <b>reduce smoking consumption</b> ) · for those who may desire an occasional change in brand."	29%	
Shoi Balaban Dickinson	Exploratory research, qualitative	N=56 respondents	package of 10, 15 and	- all respondents to be in the 18-	Response for 10 cigarettes:	31%	sponsored by a

Research Inc:	study	(24 women and 32 men)	25 cigarettes cigarettes	54 year age range  - all respondents to smoke at least one-half pack of filter  cigarettes per day	<ul style="list-style-type: none"> <li>for special occasion use</li> <li>it is the potential to be viewed as a trial size which one would purchase in order to try a new brand .</li> <li>(urge/tendency to buy)</li> <li>most respondents said that 10-pack appeared to be more bargain compared to the current pack.</li> </ul> <p>Response for 15 cigarettes:</p> <ul style="list-style-type: none"> <li>To cut down on smoking.</li> <li>consider 15 cigarettes as too small for those who smoke more than 15 cigarettes per day</li> </ul>		tobacco company
Cox AR. Twelve pack focus groups(1983)	Qualitative study	N/A  Detroit and Tanpa  -at the retail outlet only.	12 packs	In USA	<ul style="list-style-type: none"> <li>12's pack did not generate much purchase.</li> <li>Useful for temporary promotional purposes to generate occasional trial.</li> <li>smoker who are <b>interested to cut down</b> / light occasional smokers, smokers who have not been smoking for a great deal of time would be interested in 12 packs</li> <li>79% of the smokers probably and would not probably buy 12 pack</li> <li>Over half of the buyer said they would probably or definitely buy 12 pack again.</li> <li>Skewed towards young adults(mean) and lower income smoker.</li> </ul> <p>Some of the reasons for buying 12 pack are:</p> <ul style="list-style-type: none"> <li>Cute/small</li> </ul>	14%	sponsored by a tobacco company

					<ul style="list-style-type: none"> <li>· Easier to cut down smoking volume (smoking cessation)</li> <li>· Not enough money/less expensive</li> <li>· New/different</li> <li>· Usual brand not available</li> </ul> <p>Conclusion:</p> <p>Twelve packs do not represent a significant volume opportunity</p>		
Ellison Quarterly Research (1991)	Qualitative study, 23 & 24 October 1991, Boston Metro Area ( Framingham, Massachussets)	N=? 6 groups	10 or 14 cigarette pacck	<p>3 groups-among male non methol (a specific brand) smokers, age range 18-34 yo</p> <p>2 groups-female non methol (a specific brand) smoker, age range 18-24 yo</p> <p>1 group- male smoker of competitive with RJ brands</p>	<ul style="list-style-type: none"> <li>- Approximately half (or even 60-65%) able to buy a half-pack cigarette</li> <li>- Smokers prefer 10's because <b>(urge to buy)</b> <ul style="list-style-type: none"> <li>o Less expensive</li> <li>o Ease of carrying</li> </ul> </li> </ul>	26%	
Stern D (1990)	Qualitative study	N=763 adult smoker  N=50 (a specific brand) purchaser	10's pack	Adult smokers, In LA County, California	<ul style="list-style-type: none"> <li>· 10's purchaser tend to buy because they like the pack.</li> <li>· 10's packs buyer key motivation are <ul style="list-style-type: none"> <li>o Convenient size</li> <li>o Small</li> <li>o Just wanted to try</li> <li>o Less expensive</li> </ul> </li> <li>- 38% of pack of 10's purchasers would stop buying if ten pack were no longer sold.</li> </ul>	31%	sponsored by a tobacco company
Causey RA (1982)	Qualitative study	N= 8 groups(8-10 per group)	10's pack	Smokers(current smokers and ex smokers)	<ul style="list-style-type: none"> <li>· 10's packaging is well liked</li> <li>·</li> <li>· Reasons for 10's pack <ul style="list-style-type: none"> <li>o Less expensive</li> </ul> </li> </ul>	19%	sponsored by a tobacco company

- o Smoke less
- o Easy to carry around
- o Not supposed to be smoking (reason for youngsters)-easier to hide (youngsters)

The studies were different in terms of study type, sample size and target population. Studies were conducted in the United State of America (USA), Australia, United Kingdom (UK), Canada, Puerto Rico and Paraguay. Sixteen were qualitative studies [28-43] , two cross-sectional studies [44,45], one computer based online survey[46] ,one modelling count data process study [47]. The qualitative generally did not provide significant tests or impact sizes. Fourteen studies used sample packs [28,29,32,34-37,39-45] but the other six used product images [30,31,33,38,46,47]. Only five studies were able to detect the actual impact of kiddie cigarette packs after its’ introduction in the market [34,41,42,44,45] . The other fifteen studies were designed to detect the potential impact of kiddie cigarette packaging.

Only one study (Wilson et al.)[43-44] investigated the impact of actual kiddie cigarette packs among adolescents aged 14 and 15 years old.

## Methodological quality and bias of included studies

Scoring for study quality was based on the QATSDD’s 16 criteria and a short summary of each study has been included below.

The methodological quality scores all the included studies range between 14% to 74%, yielding an average quality score of 34.1%. Studies with scores higher than 70% were studies from computer-based online surveys and hypothetical modelling count data processing. Meanwhile, the studies with scores lower than 30% were qualitative studies. Criteria for which most studies scored low includingassessment of reliability of analytic process (0.0%), evidence of user’s involvement in design (0.05%), strength and limitations critically discussed (0.4%).

The results in Table 3 shows mean and standard deviation of the 16 methodological assessment criteria. Almost all evaluated studies scored an average mean of 2.81 for “clear description of research setting”. The lowest average scores were found for “assessment of reliability of analytic process” and “evidence of user involvement in design” where the average scores were 0.00 and 0.05 respectively.

Table 3  
List of criteria used to assess the methodological quality of the studies included in the review

#	Criteria	Mean	S.D	#	Criteria	Mean	S.D
1	Explicit theoretical framework	1.35	1.03	9	Statistical assessment of reliability and validity of measurement tool(s) (Quantitative only)	1.00	1.27
2	Statement of aims/objectives in main body of report	2.43	0.75	10	Fit between stated research question and method of data collection (Quantitative only)	1.50	1.23
3	Clear description of research setting	2.85	.59	11	Fit between stated research question and format and content of data collection tool e.g. interview schedule (Qualitative only)	0.79	.89
4	Evidence of sample size considered in terms of analysis	1.10	1.17	12	Fit between research question and method of analysis	.75	.91
5	Representative sample of target group of a reasonable size	0.70	.98	13	Good justification for analytic method selected	0.60	.91
6	Description of procedure for data collection	1.57	0.81	14	Assessment of reliability of analytic process (Qualitative only)	.00	.00
7	Rationale for choice of data collection tool(s)	0.90	0.72	15	Evidence of user involvement in design	0.05	.22
8	Detailed recruitment data	0.45	.89	16	Strengths and limitations critically discussed	.45	.61

Wilson et al.[44]. used a convenience sample from high schools in Adelaide, Australia. This study focused on adolescents aged 14 and 15 only and limited its survey to only two brands of cigarettes presenting a potential selection bias of the sample; wider range of age and brands may have provided further insight. The authors provided justification for their choice of study designs with clear methods but there was no discussion around potential confounders for their results.

Marti & Sindelar (2015) [46] used computer-based online survey, which involved recruitment of adults who were smokers and registered to the Yale School of Management Lab, which acted as a platform for online surveys and experiments. This led to a potential selection bias of the sample. They provided the justification for the study design, clear methods and there was discussion around potential confounders for their results.

Farrell, Fry & Harrus (2010) [47] used secondary data from an individually based nationally representative survey involving adults between the ages of 16 to 74 years old living in England. They provided relevant details and used an appropriate approach according to the objectives of their study. Potential confounders from the results were extensively discussed.

Other seventeen studies were conducted by the tobacco companies [28-43,45]. Fourteen studies were qualitative studies [35-36,36-46]. All of the qualitative studies limited its survey to limited brands of cigarettes; a wider range of brands may have provided further insights. Also, the target groups were specific to their own objectives which may not have reflected the actual scenario in the general population. Little discussion was provided around potential bias from participants and how it was managed while conducting the focus groups.

Gomez & Moralez (1996)[34] used cross-sectional studies which screened 5976 respondents, out of which 1000 were smokers and interviewed. This study did not limit its survey to certain brands, where they focused on wider brands of cigarettes. Authors provided no other detailed sampling methods and the study design was not explained. Potential confounders were also not discussed leading to potential bias.

Gomez and Guevara (1993)[45] interviewed respondents in Puerto Rico on smoker's consumer behaviours. Multiple cigarette brands were included in the study for diversity of the consumers but no other detailed sampling methods or study designs were explained. Potential confounders were also not discussed leading to potential bias.

Burke Marketing Research in its Package Size Evaluation Study (1983) [35] explored the possibilities of marketing cigarettes in a new package size. Study design and sampling size were poorly described. Convenient sampling was applied within selected shopping malls during the malls' operating hours. Respondents selection criteria was not mentioned.

## Urge / tendency to buy the kiddie packs

Kiddie packs increased the urge to buy cigarettes among smokers which was consistent with several studies discussed below. There were several reasons that influenced the urge to buy cigarettes in kiddie packs. Three studies revealed the reason for buying kiddie packs was due to its' small size [29,36,41]. Women smokers were motivated to purchase kiddie packs as it was seen as more discreet and cuter [29]. Another twelve studies revealed that the urge to buy kiddie packs was due to its' convenience of carrying it around. In a focused group study done by a research company named Paul A. Warner Association [33] showed that kiddie packs are more convenient to carry in a pocket or small purse when going to a club/party. A small qualitative study conducted by another research company which was funded by a tobacco company noted that kiddie packs were good for evening use as it fitted better into an evening bag and the quantity was sufficient for smoking after dinner [36].

Three other studies also found that the urge to buy kiddie packs increased because they were more attractive and stylish [30,31,40].

Another reason was that, the smokers just wanted to try a new product that had lesser number of cigarettes. Studies done by Cox AR [39] and Stern D [41] found that kiddie packs were seen as something new that it influenced people to try. Two studies found that the reason for buying kiddie packs was because it was easy to hide. Causey<sup>11234566</sup> [42] in a qualitative study in Paraguay found that the reason younger smokers bought kiddie packs was due to its ease in being concealed as they were not supposed to be smoking. This was similar to a finding by Wilson et al. [44] which noted that concealment was among the reason's adolescents aged 14 to 15 years old in Adelaide bought kiddie packs.

Meanwhile, there were fifteen studies noted that kiddie packs were cheaper and this stimulated purchase among the smokers [28,30,31,34,36-39,43-46]. Wood [28] in a qualitative study revealed that purchase interest of kiddie packs was driven by expected lower prices. This was similar to a study by Wolf<sup>22345677</sup> [30] which revealed that the reason behind the purchase of kiddie packs was the low price being offered.

## Attempt to reduce cigarette consumption

Attempt to reduce cigarette consumption/ smoking cessation were among the main reasons of buying kiddie packs. Some of the current smokers preferred kiddie packs as a tool to quit smoking, reduce or maintain a desired consumption level.

There were ten studies that discussed about attempts to reduce cigarette consumption [31,33-35,37,39,42,45-47].

Marti & Sindelar (2015) [46] noted that smokers who preferred smaller cigarette packs were more likely to want to quit smoking and more than 70% of smokers purchased kiddie packs to limit their cigarette consumption. Farrel, Fry & Harrus (2011) [47] hypothesized that smokers regulated their consumption according to the size of packs that were available. This study also stated that the average number of cigarettes smoked by a typical smoker was 10 sticks per day, which was equivalent to the number of sticks in the smallest packs that consumers can purchase in England. The other nine studies also showed that one of the reasons for kiddie pack preference was to smoke lesser with smaller pack size.

## Prevalence of smoking (using kiddie cigarette packaging)

No studies included in the review were able to conclude the impact of kiddie packs on the prevalence of smoking.

## Initiation of smoking among population

We did not find any study that discussed on the relationship of kiddie packs with smoking initiation.

## Discussion

We used a methodological assessment tool to assess both quantitative and qualitative studies fairly on the impact of kiddie cigarette packaging on smoking. It is likely to under estimate the scores where the studies fulfilled the criteria listed in the assessment tool without explicit reporting in the publication. Through the assessment, we found most of the studies were low quality as they were observational in nature, employed small sample sizes or reported conclusions based on short term studies.

This literature review found only few studies on the actual impact of kiddie packs on smoking. No studies evaluated more than two impacts of kiddie packs on smoking. Most studies focused only on one impact while others discussed two.



There was one cross sectional study that focused on the actual impact of kiddie packs on smoking. Wilson et al. [44] had conducted a study in Adelaide's metropolitan area to examine current smoking behaviour (in terms of urge to buy) and to assess new cigarette marketing methods among adolescents aged 14 to 15, whereby two leading brands were sold in packets of 15.

Based on our review, the main reason smokers tend to buy kiddie packs was due to its lower pricing. Lower prices of cigarette packs attracted smokers especially youngsters and the lower income group to buy the kiddie packs [42,44]. Wilson et al. [44] in their study found that teenage smokers (56.3%) had a higher proportion of buying kiddie packs compared to adult smokers (8.85%) in one month. This is consistent with studies which stated that lower prices can encourage the low-income consumers, mainly teens and minors to purchase kiddie/smaller cigarette packs due to its affordability [3], as it is proven that tobacco consumption reduced when prices increased [9-10].

Kiddie packs are convenient: easy to carry, fit into purses and pockets, easy to conceal/hide especially among women and younger smokers mostly due to its small size [29,33,42,44]. However, further high-quality studies investigating the impact of kiddie packs on the urge to buy cigarettes are needed as there are very limited resources available.

It has also been shown that one of the reasons of purchasing kiddie packs was to reduce cigarette consumption. Marti and Sindelar (2015) [46] in their study revealed that based on the regression models, preferences for pack size matched the current consumption of cigarettes, thus smokers who were interested to quit smoking and those who had a higher degree of self-control preferred to buy kiddie packs. Wilson et al. (1987) [44] in their study revealed that 10.5% of teenage smokers purchased kiddie packs in an attempt to reduce smoking. The other eight qualitative studies also noted that attempts to reduce cigarette consumption as the reason for smokers to purchase kiddie packs. This reason supported the British American Tobacco<sup>3</sup> statement in which kiddie packs encouraged heavy smokers to quit smoking. These findings suggest more high-quality studies including randomized controlled trials need to be done to investigate the actual impact of kiddie packs on reducing cigarette consumption.

Studies in the review neither investigated the impact of kiddie packs on the prevalence of smoking nor discussed the introduction of kiddie packs as a way to encourage smoking initiation among the non-smokers or by the youths. Although most studies were low in quality, the findings could provide beneficial evidence for policy implications.

Despite studies supporting that kiddie packs help to reduce cigarette consumption among current smokers, such studies are very limited. Malaysia 2012 International Tobacco Control Report stated that cigarettes are becoming more affordable to consumers as tobacco taxes and prices have not increased at a rate high enough to offset income growth [48]. Therefore, the most effective way to reduce cigarette consumption is to increase the cigarette taxes drastically. This will not only reduce the number of current adult smokers but also can deter youths from smoking initiation. When there is a tax increase, a reduction of 4% in tobacco consumption will happen in high-income countries and around 5% in low and middle-income countries [49].

Packs of 20 cigarettes with a higher price is a better way to combat the current issue compared to kiddie packs which is cheaper and smaller in size. This move will not address the illicit cigarette trading activities, which we suggest should be tackled in other ways like strengthening enforcement with heftier punishment on the traders.

In line with the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) [14] many countries have banned the sales of single sticks or kiddie packs. On the flip side, multiple attempts in reintroducing kiddie packs to combat illegal cigarettes trading are controversial. There was an argument if it is better for the smokers to buy kiddie packs with a cheaper price rather than buying illicit cigarettes. However, our review has provided evidence that kiddie packs have the tendency to increase the urge to buy cigarettes, especially among teenagers.

Overall this review provided low quality studies with an average quality score of 34.1% for all the papers. Therefore, further high-quality studies are needed for a firm conclusion on the kiddie packs effects on smoking.

In general, kiddie pack research is often limited. There are no studies exploring the impact of kiddie pack on prevalence and initiation of smoking. Most documents were old, dated from 1980 and 1990's which might not reflect the current situation. Such documents were also industry sponsored, which can have its own biasness on the objectives and desired outcomes. With these situations, we could not assess the accuracy of some of the research findings.

## Conclusion

Based on the available evidence in this systematic review, we can conclude that kiddie packs increase the urge/tendency to buy cigarettes among both smoking youth and adults. We also found evidence that kiddie packs have an effect in increasing attempts by smokers to reduce cigarette consumption. However, this study did not find conclusive evidence on the impact of kiddie packs on the prevalence and initiation of smoking.

However, due to paucity in the methods used in published studies and the absence of any clinical trials, this review highlights the need for better quality research data in the future.

More studies are needed to evaluate whether kiddie packs are effective in reducing the prevalence of smoking and initiation of smoking. More evidence is also needed to assess if kiddie packs could reduce the urge /tendency to buy cigarettes and lower cigarette consumption among the population.

## Abbreviations

PROSPERO: International Prospective Register of Systematic Reviews;WHO: World Health Organization; FCTC: Framework Convention on TobaccoControl; QATSDD: 16-item quality assessment tool; PRISMA: PreferredReporting Items for Systematic review and Meta-Analyses; ROBINS-I: Risk Of Bias In Nonrandomised Studies - of Interventions; RoB 2: The Revised Cochrane Risk of bias tool for randomized trials

## Declarations

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## Availability of data and materials

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## Authors' contributions

H and NA conceived the idea, supervised the findings of this work, wrote draft manuscript, discussed the result and contributed to the final manuscript. MF is the manager for the project, verified the results contributed to the final manuscript. H, WS, MY, TA, TG, N and A enter the data in the data extraction form and contributed to the final manuscript. H and WS developed and discussed the search strategy and contributed to the final manuscript. H, WS, MY, TA, TG, and N conducted title and abstract screening, retrieved full articles and contributed to the final manuscript. All authors read and approved the final manuscript.

## Competing interests

The authors declare that they have no competing interests.

## Consent to publish

This manuscript has obtained the approval for publication from Director General of Health, Ministry of Health Malaysia.

## Ethical approval and consent to participate

For developing this review, formal ethics approval was not required as the analysis was mainly based on review from existing data and documentation were based on published articles using a published tool.

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## Figures

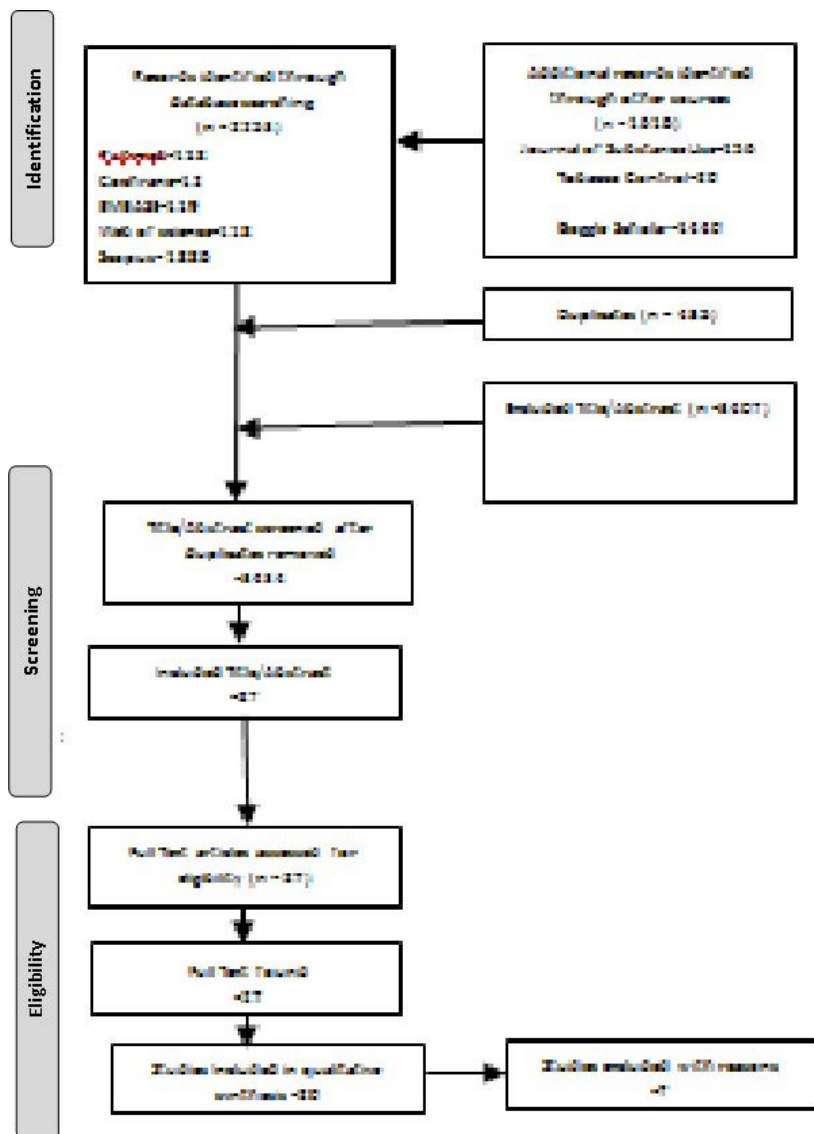


Figure 1

PRISMA 2009 flow diagram. Diagram of searches performed and the number of articles returned and examined at each stage