Journal of Biosocial Science (2020), 52: 2, 213–229
doi:10.1017/S0021932019000397

CAMBRIDGE UNIVERSITY PRESS

RESEARCH ARTICLE

Increasing misreporting levels of induced abortion in Turkey: is this due to social desirability bias?

Melike Saraç[1]* and İsmet Koç[2]

[1]Department of Social Research Methodology, Hacettepe University Institute of Population Studies, Ankara, Turkey and [2]Department of Demography, Hacettepe University Institute of Population Studies, Ankara, Turkey
*Corresponding author. Email: melikesarac@hacettepe.edu.tr

(Received 07 December 2018; revised 02 April 2019; accepted 04 April 2019; first published online 17 June 2019)

Abstract
Women tend to under-report or misreport their abortion experiences, mainly because abortion is considered a sensitive issue for cultural, religious, political or other reasons in many countries across the world. Turkey, where induced abortion is an increasingly sensitive issue due to intense statements against induced abortion on religious grounds by influential politicians, and a hidden agenda to prohibit the practice, especially in public health facilities, in recent years, is no exception. This study focused on the increase in level of misreporting of induced abortion in Turkey and its link to social desirability bias using pooled data from 1993 and 2013 Turkish Demographic and Health Surveys. A probabilistic classification model was used to classify women's reported abortions. The findings confirmed that the level of misreporting of induced abortions has increased from 18% to 53% among all terminated pregnancies over the period 1993–2013 in Turkey. This marked increase, especially among women in the lower socioeconomic sections of society, may be largely associated with the prevailing political environment, and increase in social stigmatization against induced abortion in Turkey over recent decades.

Keywords: Social desirability bias; Misreporting; Induced abortion

Introduction

Sensitive questions are asked in social surveys with the aim of estimating the attitudes, behaviours, opinions and daily life activities of respondents (Krumpal, 2011). Questions associated with sensitive issues such as illegal behaviour, sexual activities, stigmatized conduct and undesirable attitudes in society are prone to being affected by social desirability bias and thus are more likely to have extreme outcomes. In other words, respondents have a greater tendency to give socially desirable answers to sensitive survey questions by misreporting, over-reporting or under-reporting their actual situations.

The desire of respondents to provide socially desirable answers to questions related to family planning issues such as sexual activities, use of contraception and induced abortions is a common problem (Stuart & Grimes, 2009). Furthermore, questions concerning induced abortion, whether the procedure is illegal or not in a country, are usually answered reluctantly by respondents; as a result, responses in demographic surveys tend to be inaccurately reported (Casterline, 1989; Barreto *et al.*, 1992; Tennekoon, 2017). Social desirability bias is thought to explain the under- or misreporting of abortions (Jones & Kost, 2007; Astbury-Ward *et al.*, 2012). While some women do not report their abortion experience at all (see, for example, Anderson *et al.*, 1994; Magnani *et al.*, 1996; Shah *et al.*, 2011), others might misreport their induced abortion as a spontaneous abortion due to social desirability bias. Thus, studies aimed at estimating actual induced abortion

rates are important to correctly inform abortion and family planning services. In other words, examination of the validity of women's responses to questions on abortion is crucial to make accurate predictions of induced abortion rates. Complete and accurate information from other data sources, such as medical records and external data sources, can ensure more dependable comparisons of types of terminated pregnancies. Using survey data, the correct classification of terminations as spontaneous or induced is possible with a detailed examination of the abortion characteristics. Similarly, the identification of women who tend to give socially desirable answers to sensitive questions would be helpful for the planning of reproductive health policies. It is also necessary to develop strategies to increase the validity of responses by limiting social desirability bias during data collection.

Abortion was legalized in Turkey in 1983 with the enactment of a new population planning law offering safe abortion to every woman seeking the service upon request during the first 10 weeks of gestation. During the period 1983–1993, the number of reported induced abortions per 1000 pregnancies increased from 120 to 180, then stabilized at around 100–120 per 1000 pregnancies from 1998 to 2008. Although abortion is still legal in Turkey, as a consequence of politicians' intense statements against induced abortion on religious grounds since 2005, the number of reported induced abortions halved from 100 to 47 per 1000 pregnancies between 2008 and 2013. In the same period, the number of reported spontaneous abortions increased substantially from 105 to 150 per 1000 pregnancies (Adali *et al*., 2014, 2015). This unexpected decline in induced abortions and increase in spontaneous abortions in the last decade suggests that induced abortions have been misreported as spontaneous abortions.

The aims of this study were to: (1) investigate the extent of misreporting of induced abortions for the years 1993 and 2013 based on a probabilistic classification model: namely, a modified version of the World Health Organization model; (2) determine the linkages between social desirability bias and increasing trend in the misreporting of induced abortion; (3) identify the subgroups of women that are more affected by social desirability bias.

Literature review and theoretical framework

Respondents' answers to sensitive questions in social surveys are likely to be affected by social desirability bias. Misreporting or under-reporting is quite common for sensitive social issues such as wealth, religious participation and voting behaviour (Lee, 1995; Tourangeau *et al*., 2000). Furthermore, there is evidence for a direct relationship between under-reporting and misreporting and the sensitivity level of questions (Ong & Weiss, 2000). The German General Social Survey evaluated the relationship between sensitivity level and data quality based on questions on household net income, voting intentions, religious denomination, educational achievement, membership of a trade union, employment status and age by examining item-level non-responses (Lensveldt-Mulders, 2008).

The literature on social desirability bias has mostly focused on differentiating between data collection modes with the aim of obtaining honest answers from respondents by reducing the effect of social desirability bias on the estimates. The presence of an interviewer during the data collection process is commonly considered to be the biggest trigger factor for respondents giving socially desirable answers (Groves & Khan, 1979; Holbrook *et al*., 2003; Krysan & Couper, 2003; Kreuter *et al*., 2008; Mavletova, 2013; Mavletova & Couper, 2013). In addition, the social distance or rapport between interviewers and respondents, based on the selected interviewing technique, is also often considered to be an influencing factor (Dijkstra, 1989).

The under-reporting of abortions in health surveys is a frequent subject of discussion in abortion studies. There is empirical evidence that abortion-related questions are widely affected by social desirability bias, and thus under-reported by survey respondents (Anderson *et al*., 1994; Jagannathan, 2001; Jones & Kost, 2007; Tourangeau & Yan, 2007; Scott & Lindberg, 2016; Zamanian *et al*., 2016). For example, Jones and Kost (2007) concluded that only 47% of all abortions were reported in

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

face-to-face interviews in the 2002 USNSFG (United States National Survey of Family Growth) when comparing survey data with information gathered from abortion patients and providers. The NSFG therefore warns data users to be cautious (USNSFG, 2014). Missing information on questions on abortion has also been discussed within the context of under-reporting (Tierney, 2017). Abortion is such a sensitive issue that abortion-related questions can be considered 'threatening' to survey respondents (Bradburn *et al*., 1980). Privacy matters, interview settings and unwillingness to share information about abortion with others, negative stigmatization in a society and lack of confidentiality were among the factors resulting in social desirability bias in abortion-related estimates (Anderson *et al*., 1994). The existence of under-reporting in retrospective fertility surveys, regardless of the legality issues related to abortion, has also been reported (Basu, 2003).

The misreporting of abortions due to social desirability bias can be considered a form of under-reporting (Anderson *et al*., 1994; Shah *et al*., 2011). There is evidence that induced abortions are sometimes misreported as miscarriages (Anderson *et al*., 1994). Potter *et al*. (1975) stated the reason for the misreporting of induced abortions as competition between induced and spontaneous abortions. Keogh *et al*. (2015) put forward the view that fear of legal sanctions might be behind the misreporting of induced abortions, as well as the similarities between the complications of induced and spontaneous abortions. Similarly, social courtesy bias has been suggested as a reason for the misreporting of induced abortions in population-based surveys, together with recall bias (Johnston *et al*., 2010). The possibility of misreporting was also emphasized by Shah *et al*. (2011) when attempting to explain the similar mortality and morbidity levels of the babies of women who have induced abortions through a traditional birth attendant and those visiting a doctor for post-miscarriage care.

Comparisons of self-reported survey data and external medical records on abortions have allowed the level of under-reporting of abortions to be estimated (Udry *et al*., 1996; Jagannathan, 2001), although data sources might be upwardly biased (Jones & Forrest, 1992). However, comparison of a respondent's answers on abortion-related questions in the same questionnaire or in a series of surveys, or with the answers of another respondent in the same family, is the main approach for detecting the under-reporting or misreporting of abortions (Anderson *et al*., 1994). Rossier (2003) reviewed all the methods of estimating induced abortion levels, including using data on illegal abortion providers, complications statistics, mortality statistics, self-reports, prospective studies, anonymous third-party reports and estimates from experts. Furthermore, direct and indirect estimation techniques (such as probabilistic classification schemes, the residual method, the network scale-up method and a binomial-thinned zero-inflated Poisson model) have been used to provide accurate abortion incidence rates after the data collection process (WHO, 1987; Magnani *et al*., 1996; Bendavid *et al*., 2011; Zamanian *et al*., 2016; Tennekoon, 2017).

Barreto *et al*. (1992) drew attention to the potential risk of data misrepresentation by identifying the subgroups of women who were least likely to participate in a survey and reluctant to answer questions. They found that certain subgroups of women may answer more freely than others, even though they had given their informed consent. Fertility level, demographic characteristics, survey implementation and emotional repression were ranked as possible factors affecting the risk of under-reporting abortions (Hammerslough, 1987; London & Williams, 1990; Jones & Forrest, 1992; Huntington *et al*., 1993; Anderson *et al*., 1994; Udry *et al*., 1996). Ethnicity, marital status, education, age, number of previous live births, number of previous abortions and gestational age (in weeks) are among the demographic factors influencing the under-reporting of induced abortions (Anderson *et al*., 1994). The impact of respondents' attitudes towards abortion and childbearing experiences have been examined by taking physical, social, psychological and moral values into account, in addition to demographic characteristics, survey implementation and fertility-related factors (Jagannathan, 2001). The sensitivity level of abortion-related questions has also been discussed in terms of how respondents viewed the risk of providing accurate answers. Another study investigated the impact of the interview environment on the

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

under-reporting of induced abortion based on the varied mode of data collection, interviewer characteristics and presence of family members during the interview (Rasinski *et al*., 1994).

Studies on the under- and misreporting of abortions are creating awareness of the problem of social desirability bias in surveys. The common focus of abortion methodological studies has been to suggest various strategies to increase the validity of abortion-related answers, as well as to suggest methods of calculating accurate abortion incidence rates. Direct and indirect question styles have been discussed within the context of a higher rate of abortion reporting. The importance of the randomized response technique has been discussed by comparing face-to-face interviews, CASI (Computer Assisted Self-interviews) and self-administrated questionnaires as ways of increasing the validity of answers to abortion-related questions (Hammerslough, 1987; Huntington *et al*., 1993; Lara *et al*., 2004; Coutts & Jann, 2011). Anderson *et al*. (1994) suggested using a life history chart in the data collection process to minimize errors in the reporting of abortions. Similarly, a new data collection approach, namely the ballot-box technique, has been recommended to ensure valid responses to abortion-related questions (Medeiros & Diniz, 2012).

Methods

Data source

The main data sources for the study were the 1993 and 2013 Turkish Demographic and Health Surveys (TDHSs) conducted by the International DHS Programme. These data sets provide comprehensive information on the reproductive health characteristics of women for the two survey years, gathered by face-to-face household and women's interviews. Women of reproductive age (between 15 and 49 years) were considered eligible for interview. The calendar part of the questionnaire enabled indications of abortions to be followed on a month-by-month basis during approximately 5 years prior to the survey date. This revealed pregnancy outcomes: whether a pregnancy ended in an induced abortion, spontaneous abortion, stillbirth or live birth. Other characteristics required to classify abortions were utilized from elsewhere in the data sets.

The length of the calendar period, namely the number of months that were followed retrospectively, varied between 69 and 72 depending on the month of the interview. The numbers of induced abortions and spontaneous abortions were taken from the complete calendar period of the women to capture all their abortions prior to the survey date. The questionnaire and sampling designs of the TDHSs allowed a comparison of survey estimates to be made across the survey years. Overall, the variables used for the analyses were common to both data sets to ensure comparability. All descriptive and multivariate analyses were performed using SPSS Version 21.0.

Prior to the TDHS data collection process, the Ethics Committee of Hacettepe University evaluated the data collection stage of the research and approved the questionnaires used in the fieldwork. Furthermore, informed consent was received from each respondent immediately before interview.

Classification of abortions

The World Health Organization has developed an algorithm to classify hospitalized women's terminations based on self-reporting or a verbal autopsy (when a woman had died), women's contraceptive use in terms of planned pregnancy, desire for pregnancy and other medical signs such as trauma or sepsis related to the abortion (WHO, 1987; Muchova, 2013). This WHO classification scheme was based on women who had informed hospitals about complications resulting from their terminated pregnancies. A modified version of the WHO classification scheme was employed in this study to classify pregnancy terminations in the data sets as 'probably induced' or 'probably spontaneous'. (The word 'probably' was used rather because the model was a modification of the clinic-based WHO classification model.) Ongoing pregnancies on the date of the

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

Table 1. Description of modified model for the classification of abortions

Type of abortion	Indicator	Description
Probably spontaneous	Third-trimester termination (1)	Length of gestation more than 6 months
	Discontinuation of contraceptive use to become pregnant (2)	Woman reported discontinuing contraceptive method use prior to termination to become pregnant
	Married women of 0 or 1 parity (5)	Married women of parity 0 or 1 at time of termination
Probably induced	Contraceptive use failure (3)	Termination occurred during contraceptive method use or 2 months or less after discontinuation
	Unwanted pregnancy (4)	Termination occurred after a live birth that was reported as an unwanted pregnancy or number of surviving children exceeded the number of desired children at the time of termination
	Unmarried women younger than 25 (6)	Women was unmarried and under 25

Classification is based on the criterion that is assumed to have the highest probability of accuracy.
(1), (2), . . . , (6) illustrate the sequence of probability, from highest to lowest.

survey were excluded as their outcomes (induced abortion, spontaneous abortion, stillbirth or live birth) were unknown, as were terminations with missing information (pregnancy duration, reason for method discontinuation, parity number at time of termination and desired number of children). These excluded terminations were labelled as 'unclassifiable'.

The following characteristics were used to classify terminations: (1) the basic properties of the terminated pregnancy, including length of gestation, contraceptive use prior to the termination and reason for contraceptive discontinuation; (2) the woman's age, parity and marital status at the time of the termination; and (3) a woman's desire for children prior to the termination (Table 1). The classification criteria are listed sequentially according to their probable accuracy, as described by Bendavid *et al.* (2011), Muchova (2013) and especially Magnani *et al.* (1996).

Third-trimester terminations (gestation length of more than 6 months) were classified as spontaneous abortions, as these had a high probability of being spontaneous. Similarly, a termination occurring after the discontinuation of contraceptive use due to the desire to conceive was also considered to be a spontaneous abortion. Lastly, terminations of married women with a parity of 0 or 1 at the time of termination were classified as spontaneous because of the general desire of women to have more than 0 or 1 child in the Turkish context.

Terminations that occurred any time during a woman's contraceptive use period were classified as induced abortions. Furthermore, a termination that occurred within 2 months of discontinuation of a modern or traditional contraceptive (withdrawal, rhythm or folkloric methods) was assumed to be an induced abortion, based on the forward effects of contraceptives. Women who used contraception for spacing or limiting were accepted as being unwilling to have an additional child or no more children at all. Another sign of an induced abortion was the lack of desire of women to have one more child. Thus, a termination that occurred after a live birth was considered to be an induced abortion if the woman admitted that the live birth had been an unwanted pregnancy. Furthermore, if the number of a woman's surviving children at the time termination was more than her declared ideal number of children, as stated by her at the time of survey, the termination was classified as an induced abortion. Finally, the terminations of unmarried women under 25 were classified as induced abortions due to the social stigma attached to unmarried motherhood in many societies around the world.

The outcomes produced by the model were accepted as 'accurate' despite the limitations, whereas the outcomes reported by women were accepted as 'suspicious'. This assumption was made in order to determine the extent to which induced abortions were misreported by women

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

Table 2. Description of specificity and sensitivity levels used to describe the gap between reported and predicted induced and spontaneous abortions

	Predicted abortions	
Reported abortions	Spontaneous abortions	Induced abortions
Spontaneous abortion	x	z
Induced abortion	y	t
Total	$x+y$	$z+t$
	Sensitivity : $1-\frac{x}{x+y}$	Sensitivity : $1-\frac{t}{z+t}$

because of social desirability bias. Briefly, all assessments on the level of misreported induced abortions were made under the assumption that this classification model was accurate.

Definition of concepts

Two proportion-type indicators – 'sensitivity' and 'specificity' levels – were created to describe the gap between reported and predicted abortions. The 'specificity' level indicates the level of misreporting of induced abortions due to them being labelled as miscarriages. The 'sensitivity' level indicates the level of misreporting of spontaneous abortions due to labelling them as induced abortions (Table 2). These two indicators were used to determine the level of misreporting of abortions, and to identify women with a higher tendency to misreport their induced abortions. The specificity level that resulted from the comparison of the classification model outputs and reported terminations was used to determine the extent of misreporting of induced abortions within all terminated pregnancies in the study.

To explain the gap between induced abortions reported by women and induced abortions predicted by the model, induced abortion rates per 1000 pregnancies were calculated for both conditions as follows:

$$\text{Induced abortion rate}_{\textbf{reported}} = \frac{\text{number of } \textbf{reported} \text{ induced abortions during the calendar period}}{\text{number of all completed pregnancies during the calendar period}}$$

$$\text{Induced abortion rate}_{\textbf{predicted}} = \frac{\text{number of } \textbf{predicted} \text{ induced abortions during the calendar period}}{\text{number of all completed pregnancies during the calendar period}}$$

where 'completed pregnancies' included those that resulted in induced abortions, spontaneous abortions, stillbirths and live births. Miscarriages and stillbirths were included under spontaneous abortions.

Descriptive and multivariate analyses

In the descriptive analysis, the distribution of terminations based on the classification scheme, the sensitivity and specificity levels, abortion rates on the basis of reported and predicted induced abortions and the identification of women's characteristics that indicate a higher tendency to misreport, were determined in order to inform the multivariate analyses on the identification of the risk of misreporting induced abortions.

A series of logistic regression analyses were employed to determine the factors behind the misreporting of induced abortions. A set of covariates, including women's age, type of residence, region, education, mother tongue and wealth status, were used to identify women most affected by social desirability bias and thus more prone to misreport their induced abortions. All variables

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

Table 3. Covariates used in the three models of the multivariate analysis

Model 1 Survey year		Model 2 Survey year + basic characteristics		Model 3 Survey year + basic + contextual characteristics	
Survey year	1993	Survey year	1993	Survey year	1993
	1998		1998		1998
	2003		2003		2003
	2008		2008		2008
	2013		2013		2013
		Age group	15–24	Age group	15–24
			25–29		25–29
			30–34		30–34
			35–39		35–39
			40–49		40–49
		Education	No education	Education	No education
			Primary		Primary
			Secondary and higher		Secondary and higher
				Region	West
					South
					Central
					North
					East
				Type of settlement	Urban
					Rural
				Wealth	Poor
					Medium
					Rich
				Mother tongue	Turkish
					Kurdish
					Arabic and other

included in the TDHS women's data set were considered to potentially have an impact on the misreporting of induced abortions.

The multivariate models were conducted on the pooled data set constructed from surveys in 5-year intervals over the period 1993–2013. Therefore, a variable 'survey year' was included in all models to measure the time effect in misreporting levels over the survey years. The multivariate regression models were conducted in three estimation stages. Model 1 only included the time effect variable, whereas Model 2 also included basic characteristics of the women, such as age and education. Finally, Model 3 included the contextual characteristics of women such as mother tongue, region, type of settlement and wealth status, in addition to the variables included in the previous models (Table 3).

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

Some of the factors behind the misreporting of induced abortions were not included in the multivariate models since they were used to classify terminations. For instance, method of contraception and women's marital status were used for the classification, but were not included in the logistic regression models, even though these have been found to be significant factors in the misreporting of induced abortions in previous studies (Jones & Forrest, 1992; Anderson *et al.*, 1994).

Independent variables

The ages of the women were re-coded as '15–24', '25–29', '30–34', '35–39', and '40–49' years. The region variable refers to the five demographic regions in Turkey, classified according to development level: 'West', 'North', 'Central', 'South' and 'East' according developmental levels. West and Central are the most developed regions, South and North are known as the medium-developed regions and the East region is ranked as the least-developed region in Turkey. Type of settlement was categorized as urban (population of 10,000 or more) or rural (population of less than 10,000). Education of women was categorized as 'none', 'primary' and 'secondary and higher'. The variable 'mother tongue' was categorized as 'Turkish', 'Kurdish' and 'Arabic and other' (the languages spoken in Turkey). Lastly, the household wealth variable, based on household assets, and categorized as 'poor', 'medium' and 'rich'.

Results

Descriptive results

The percentage of all terminations that were 'unclassified', i.e. with unknown termination outcomes, was around 9.5% for both survey years (1993 and 2013). As for the rest, the predicted percentage of spontaneous abortions decreased as the probability of conditions classifying them as spontaneous abortions increased. For instance, third-trimester terminations had the lowest percentage among predicted spontaneous abortions for both survey years. The percentage of women who had discontinued contraceptive use in order to become pregnant before the termination increased from 5% to 27% from 1993 to 2013. This may be because of the increase in the conscious use of contraception among couples over this period. A similar increase was observed in married women with 0 or 1 living children at the time of termination. This increase may be related to the decline in fertility rates in Turkey over the same period. Overall, spontaneous abortions predicted by the model almost doubled, from 29% to 59%, in the period 1993 to 2013 (Table 4).

In contrast to spontaneous abortions, the percentage of predicted induced abortions increased with the increased probability of conditions that classify them as induced abortion. For instance, the percentage of terminations that came after the discontinuation of contraceptive use constituted a major proportion of the predicted induced abortions. The percentage of terminations resulting from contraception failure decreased from 58% to 37% from 1993 to 2013. This may be associated with the increase in the effective use of contraception among women in Turkey over the survey years. Unwanted pregnancies that resulted in live births prior to termination(s), and which came after a woman's number of living children corresponded to her ideal number of children, declined from 13% to 4% over the period. The percentage of unmarried women under the age of 25 in the month of termination increased slightly from 0.1% to 0.7% over the study period. Overall, the classification model predicted many more spontaneous abortions as a proportion of all terminations in 2013 compared with 1993. This may be attributed to two factors: (1) the number of spontaneous abortions as a proportion of all terminations may have increased markedly over time; and (2) the misreporting of induced abortions may have increased. Conversely, the number of induced abortions predicted by the model decreased from 71% to 41% over this period (Table 4).

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

Table 4. Percentage distribution of pregnancies according to classification scheme

Classification number	Classification and condition	All terminations		Classified terminations		Unweighted *n*	
		1993	2013	1993	2013	1993	2013
1	Third-trimester termination	4.1	2.0	4.5	2.2	64	481
2	Respondent discontinued contraceptive use in order to become pregnant	4.7	24.0	5.2	26.5	73	18
5	Respondent married/in union and of parity 0 or 1 at termination	17.2	27.2	19.0	30.1	266	217
	Probably spontaneous	26.0	53.2	28.7	58.8	403	246
3	Contraceptive use failure	52.3	33.3	57.9	36.8	809	301
4	Unwanted pregnancy	12.0	3.4	13.3	3.8	186	31
6	Respondent neither married nor in union and younger than 25	0.1	0.6	0.1	0.7	1	6
	Probably induced	64.4	37.3	71.3	41.3	996	338
	Unclassified terminations/pregnancies	9.5	9.4	NA	NA	147	85
	Number of terminations	1546	903	1398	818	1546	903

Table 5. Number of reported and predicted abortions and sensitivity and specificity levels

Reported abortions	Predicted abortions		
	Spontaneous	Induced	Total
2013			
Spontaneous	438	177	615
Induced	43	160	203
Total	481	337	818
Sensitivity	8.9	-	-
Specificity	52.5	-	-
1993			
Spontaneous	335	178	513
Induced	68	818	885
Total	403	996	1398
Sensitivity	16.9	-	-
Specificity	17.9	-	-

The specificity and sensitivity levels, produced by comparing predicted and reported abortions, indicated the misreporting of induced abortions and spontaneous abortions, respectively. The specificity rate was found to be 18% in 1993, implying that some of the reported spontaneous abortions were probably induced abortions according to the model. Looking at the year 2013, the percentage of misreported induced abortions (the specificity rate) increased to 53% of all abortions. The increase in the specificity rates over the period confirmed the increasing impact of statements against induced abortion by influential politicians, as well as the ability of the model to capture induced abortions misreported as spontaneous abortions (Table 5).

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

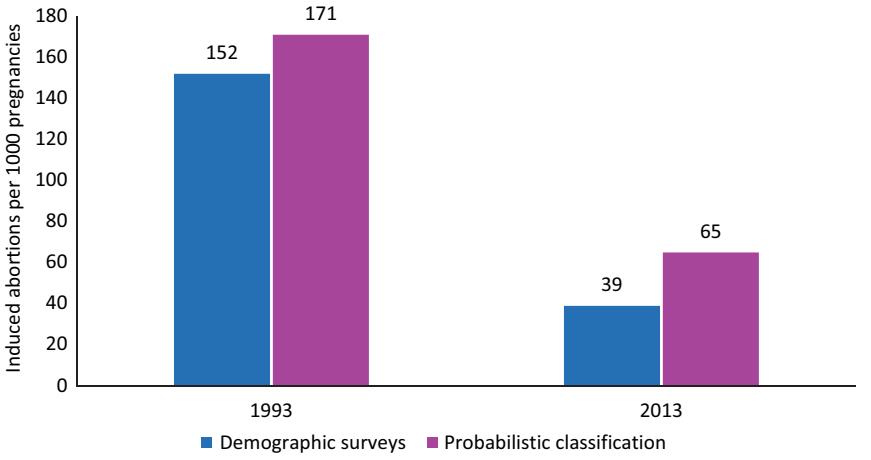

Figure 1. Comparison of predicted and reported induced abortion rates per 1000 pregnancies, TDHS 1993 and 2013.

The impact of the misreporting level, namely labelling induced abortions as spontaneous abortions, had a direct effect on the induced abortion rate. According to the reported number of induced abortions, the induced abortion rate for the whole calendar period declined from 152 to 39 per 1000 pregnancies from 1993 to 2013. On re-calculation of the induced abortion rate based on the model assumptions, this declined from 171 to 65 per 1000 pregnancies over the same period (Fig. 1). These figures imply that the adjusted induced abortion rate in 2013 was approximately 35% higher than the reported level, due to social desirability bias.

In line with the specificity rates found at overall level, the levels of misreporting by all the women's characteristics were much higher in 2013 as opposed to those in 1993. In both surveys, women aged between 15 and 24, women living in rural areas, women living in the East region of Turkey, uneducated women and women living in poor households had a higher tendency to misreport their induced abortions. Overall, the specificity levels imply that the misreporting behaviour of women regarding their induced abortions declines as their age increases, and younger women are more likely to misreport their abortions. Similarly, women living in urban and Western parts of Turkey misreported their induced abortions less often than did women living in the East region. Women with higher education and higher wealth had a lower likelihood of misreporting induced abortions. In line with these findings, Kurdish women had a higher tendency to misreport their induced abortions compared with Turkish and Arabic women in both years (Table 6).

Multivariate results

The final model of the logistic regression analysis suggested that the risk of misreporting induced abortions was associated with a time effect and women's age, educational level, region of residence and wealth status. The impact of mother tongue was found to be insignificant. The risk of misreporting was approximately 6 times higher in 2013 compared with 1993. Women aged 15–24 had a 3.4 times higher risk of misreporting induced abortions compared with women aged 40–49. Similarly, uneducated women had a higher tendency to misreport their induced abortions compared with women with secondary and higher educations. Women living in the East and North regions of Turkey had a higher risk of misreporting than women living in the West region. Multivariate results showed that the odds ratio of misreporting among women living in rural areas was 1.4 times higher than among women living in urban areas. Furthermore, women of poor and medium levels of wealth had a significantly higher risk of misreporting than women living in richer households. These results confirm that women in the lower segments of society feel pressure

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

Table 6. Specificity levels of abortions by women's characteristics

Characteristics	1993		2013	
	Specificity level	Weighted *n*	Specificity level	Weighted *n*
Age				
15–24	21.1	261	61.3	131
25–29	20.6	334	57.4	211
30–34	17.7	349	62.8	204
35–39	14.9	282	39.8	163
40–49	18.5	173	46.2	109
Type of settlement				
Urban	13.9	979	50.4	673
Rural	27.3	419	63.2	145
Region				
West	14.1	519	42.5	356
South	15.8	204	39.3	89
Central	16.5	342	56.9	149
North	19.0	135	64.0	59
East	34.4	197	70.8	164
Education				
No education	28.7	314	64.9	76
Primary	15.3	797	54.4	317
Secondary	11.5	236	52.2	305
Higher	15.8	52	39.2	120
Wealth				
Poor	27.8	379	59.0	290
Medium	17.8	473	61.9	275
Rich	12.3	544	35.5	254
Mother tongue				
Turkish	16.6	902	56.9	485
Kurdish	35.7	70	80.9	135
Arab and other	13.0	23	50.0	24

from the political environment in the country around induced abortion much more than do women in the higher segments of society (Table 7).

Discussion

The findings of this study, based on a probabilistic classification of abortions, confirmed that the misreporting level of induced abortions in Turkey has increased from 18% to 53% of all terminated pregnancies over the period 1993–2013. In other words, women who participated in the

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

Table 7. Logistic regression models for the risk of misreporting of induced abortions, 1993–2013

Variable	Basic model	Individual variables added	Contextual variables added
Survey year			
1993 (Ref.)	1.0	1.0	1.0
2013	5.1*	6.6*	5.8*
Age group			
15–24	—	3.5*	3.4*
25–29	—	2.1*	2.1*
30–34	—	1.6*	1.6*
35–39	—	1.1*	1.1
40–49 (Ref.)	—	1.0	1.0
Education			
No education	—	3.1*	1.7*
Primary	—	1.2**	0.9
Secondary and higher (Ref.)	—	1.0	1.0
Region			
West (Ref.)	—	—	1.0
South	—	—	0.9
Central	—	—	1.1
North	—	—	1.3*
East	—	—	2.3*
Type of place of residence			
Urban (Ref.)	—	—	1.0
Rural	—	—	1.4*
Wealth			
Poor	—	—	1.5*
Medium	—	—	1.3*
Rich (Ref.)	—	—	1.0
Nagelkerke's R^2	0.07	0.13	0.17

Ref., reference category.
*$p<0.01$; **$p<0.05$.

TDHSs increasingly preferred to label their induced abortions as miscarriages. The significant increase in the level of misreporting of induced abortion appeared to be related to social desirability bias, with induced abortion becoming an increasingly sensitive issue in Turkey. Influential politicians are making intense statements against induced abortion, with some describing it as 'murder' on religious grounds, and there has been a hidden prohibition of the practice of induced abortion, especially in public health facilities, in recent years. Although the 1983 abortion law is still in force in Turkey, induced abortion was described as murder by the Prime Minister of the country in 2012 (Ozdemir, 2012; O'Neil, 2017). There is growing evidence that access to induced abortion services is being narrowed down in Turkey, especially in public health facilities. Previous

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

studies have emphasized that, although no new legislation restricting abortion services has been enacted, public health facilities are reducing the provision of abortion services (O'Neil *et al*., 2016; O'Neil, 2017; MacFarlane *et al*., 2017). As a result of this political intervention only 16% of public health facilities provide abortion services without any restrictions as to reason in Turkey (O'Neil *et al*., 2016; O'Neil, 2017).

The increase in the reported level of spontaneous abortions may be partly related to the increase in the use of assisted reproductive techniques in the period 2005 to 2010 (Koç & Saraç, 2017; Saraç & Koç, 2017), together with the increasing tendency to label induced abortions as spontaneous abortions, especially in the period 2008 to 2013, with the increasing impact of social desirability bias. The demographic surveys conducted during the 1993–2013 period pointed out that all reproductive health indicators that elevated the risk of the spontaneous abortions (e.g. perinatal mortality rate, contraceptive prevalence rate, rate of postnatal care) were getting better in Turkey (HUIPS, 2014). As a consequence of this, the increase in the spontaneous abortion rate in the study period cannot be explained by the deterioration in these reproductive health indicators.

The findings on the level of misreporting induced abortions in Turkey for 1993 are mostly in line with those of a previous study by Magnani *et al*. (1996). To the best of the authors' knowledge, there has only been one other study in Turkey that has focused on the level of under-reporting of induced abortions. Tezcan and Omran (1981) compared the results of two techniques, namely RRT (randomized response technique) and DQT (direct question technique), and found that RRT was much more successful at catching induced abortions as opposed to DQT, with 59% more induced abortions being found by RRT. Some other studies conducted in the context of Turkey have shown the prevalence of induced abortion and its covariates (Senlet *et al*., 2001a, 2001b; Altun, 1995; Cavlin, 2007). Other qualitative studies discussed the perception and sensitivity of induced abortion in Turkey at societal and individual levels (Gursoy, 1996; Cavlin *et al*., 2012). It should be pointed out that none of these studies in Turkey focused on determining the risk factors behind the misreporting of induced abortions in a multivariate manner.

There is only limited information on the reasons for induced abortion in Turkey. The 2003 TDHS data pointed out that non-preference for another child, the closeness between the pregnancy and previous pregnancy, child and women health related issues, economic problems and problems in the family were the main reasons behind induced abortion (HUIPS, 2004). Other studies (Senlet *et al*., 2001a, 2001b; Ergocmen *et al*., 2004) showed the high failure rates associated with the withdrawal method to be the main reason behind induced abortion in Turkey. Between 1993 and 2013, the proportion of induced abortions in Turkey resulting from use of traditional methods declined significantly. While this is encouraging, according to the 2013 TDHS withdrawal failure still accounts for 37% of all abortions (HUIPS, 1994, 2014).

The final logistic regression model indicated that the time effect was one of the most significant variables affecting the level of misreporting of induced abortions. The likelihood of misreporting induced abortions was found to be 6 times higher in 2013 compared with 1993. This once more implies that the political environment against induced abortion during the 2010 s increased the sensitivity level of abortion questions dramatically. This in turn appeared to create greater pressure on the respondents in the way of social stigmatization at the time of the 2013 survey. Considering misreporting as a special type of under-reporting of induced abortions, the incidence of misreporting was influenced by social desirability bias in Turkey as a consequence of its highly sensitive nature, as well as the cultural, religious and political considerations as mentioned in different studies for different social settings (Anderson *et al*., 1994; Magnani *et al*., 1996; Jagannathan, 2001; Tourangeau & Yan, 2007; Shah *et al*., 2011; Zamanian *et al*., 2016). In other words, the marked increase in the misreporting of induced abortions may be associated to a great degree with the prevailing political environment and social stigmatization against induced abortions in Turkey. In addition to the time effect, the final model of the logistic regression showed that the risk of induced abortion misreporting was associated with women's age, type of settlement, region, educational level and wealth level. The differences may be due to women's views on

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

having an abortion within the context of stigmatized behaviours (Anderson *et al*., 1994). The effect of the age of a woman on the likelihood of misreporting or under-reporting induced abortions has been well-documented in other studies (Anderson *et al*., 1994; Lara *et al*., 2004; Jagannathan, 2001).

This study found that the risk of misreporting induced abortions was significantly inversely related to the educational level of women and their wealth status. This relationship between educational level and the risk of misreporting has been found by other studies (Anderson *et al*., 1994; Udry *et al*., 1996; Jagannathan, 2001; Lara *et al*., 2004; Jones & Kost 2007; Tennekoon, 2017). Similarly, the risk of misreporting induced abortions among women living in poor households was 1.5 times higher compared with women living in richer households. A similar result was found in studies with different definitions of wealth, such as short-term and long-term welfare recipients (Fu *et al*., 1998; Jagannathan, 2001, Lara *et al*., 2004). The risk of misreporting induced abortions had a distinct relationship with the region and type of settlement where women lived. Regional and residential differences have been found to be significant factors behind the misreporting of abortions in other studies as well (Mosher 1985; London & Williams, 1990; Jones & Forrest, 1992; Anderson *et al*., 1994; Hammerslough, 1987; Jagannathan, 2001; Lara *et al*. 2004; Jones & Kost, 2007; Tennekoon, 2017). These findings, yet again, suggest that women from lower segments of the society are more affected by social desirability bias in Turkey.

In conclusion, the classification model used in the present study may be considered as a reasonable tool to detect the misreporting of abortions, despite its inadequacies. There are claims that the classification model tends to overestimate the number of induced abortions (Rossier, 2003; Muchova, 2013). However, as Muchova (2013) pointed out, under-reporting or misreporting of induced abortions can be evaluated in spite of the shortcomings of the classification model where no precise data are available for comparison. Another limitation of the classification model could be that it ignores survey implementation tactics (such as interviewer behaviour, the directness of the abortion question, mode of administration and length of interview) as well as psychological depression (Huntington *et al*., 1993; Udry *et al*., 1996; Fu *et al*., 1998; Jagannathan, 2001; Lara *et al*., 2004). Such variables could not be included in the model and thus in the study due to the lack of this information.

It should be noted that there are no other sources or precise data such as medical records or clinical registrations in Turkey to use for comparison with survey data. For that reason, the probabilistic classification model used here is unique and the most appropriate way to classify terminations for comparison purposes in the country. This implies that the survey data in Turkey needs an external data source to make reasonable inferences by comparing alternative data sources and making accurate interpretations on abortion rates. This study's use of a probabilistic classification model to determine the level of misreporting of induced abortions fills a gap in the literature. The determination of the risk factors for social desirability bias, which affects the misreporting of induced abortions in the Turkish context, is another contribution of the study. It also introduced a new perspective that could help determine the influence of time, age, educational, regional and wealth factors on the increasing levels of misreported induced abortions due to social desirability bias. Furthermore, as Scott and Lindberg (2016) emphasized, women who misreport their abortions are more likely to misreport their other reproductive health events such as use of contraception and reproductive histories. This calls for further studies aimed at examining the extent to which other reproductive health information is misreported or under-reported in Turkey.

Funding. This research received no specific grant from any funding agency, commercial entity or not-for-profit organization.

Conflict of Interest. The authors have no conflicts of interest to declare.

Ethical Approval. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

References

Adali T, Cavlin A and Berktas E (2015) İsteyerek ve Kendiliğinden Düşüklerin Yaygınlığı ve Düşükleri Etkileyen Faktörler [The prevalence of spontaneous and induced abortions and the factors affecting them]. In *2013 Nüfus ve Sağlık Araştırması İleri Analiz Çalışması [Further Analysis of TDHS-2013]*. Hacettepe University Institute of Population Studies, Ankara. ISBN 978-975-491-412-2. http://www.hips.hacettepe.edu.tr/tnsa2013/rapor/TNSA2013_ilerianaliz.pdf (accessed 25 May 2019).

Adali T, Koç I and Eryurt MA (2014) The spontaneous and induced abortions. In *2013 Turkey Demographic and Health Survey (TDHS-2013)*. ISBN 978-975-491-389-7. Hacettepe University Institute of Population Studies, Ankara. http://www.hips.hacettepe.edu.tr/tnsa2013/rapor/TDHS_2013_main.report.pdf (accessed 25 May 2019).

Altun A (1995) Türkiye'de İstemli Düşüğün Boyutları. [The aspects of induced abortion in Turkey.] MA Dissertation. Institute of Population Studies, Hacettepe University, Ankara.

Anderson BA, Katus K, Puur A and Silver BD (1994) The validity of survey responses on abortion: evidence from Estonia. *Demography* **31**(1), 115–132.

Astbury-Ward E, Parry O and Carnwell R (2012) Stigma, abortion, and disclosure– findings from a qualitative study. *Journal of Sexual Medicine* **9**(12), 3137–3147.

Barreto T, Campbell OM, Davies JL, Fauveau V, Filippi VG, Graham WJ, *et al.* (1992) Investigating induced abortion in developing countries: methods and problems. *Studies in Family Planning* **23**(3), 159–170.

Basu AM (2003) *The Sociocultural and Political Aspects of Abortion: Global Perspectives*. Greenwood Publishing Group.

Bendavid E, Avila P and Miller G (2011) United States aid policy and induced abortion in sub-Saharan Africa. *Bulletin of the World Health Organization* **89**(12), 873–880.

Bradburn NM, Sudman M, Blair E, Locander W, Miles C, Singer E and Stocking C (1980) Improving interview method and questionnaire design: response effects to threatening questions in survey research. *Social Forces* **59**(1), 325–326.

Casterline JB (1989) Collecting data on pregnancy loss: a review of evidence from the World Fertility Survey. *Studies in Family Planning* **20**(2), 81–95.

Cavlin A, Tezcan S and Ergocmen B (2012) Kadınların Bakış Açısından Kürtaj [Women's perspective on induced abortion]. *Turkish Journal of Population Studies* **34**(1), 51–67.

Cavlin BA (2007) Re-placing induced abortion and contraception: a special focus on ethno-cultural differences in the cases of Turkey and selected Central Asian States. PhD Dissertation, Institute of Population Studies, Hacettepe University, Ankara.

Coutts E and Jann B (2011) Sensitive questions in online surveys: experimental results for the Randomized Response Technique (RRT) and the Unmatched Count Technique (UCT). *Sociological Methods & Research* **40**(1), 169–193.

Dijkstra W (1989) Interviewing style and respondent behavior: an experimental study of the survey interview. *Sociological Methods & Research* **16**(2), 309–344.

Ergocmen BA, Koç I, Senlet P, Yigit EK and Roman E (2004) A closer look at traditional contraceptive use in Turkey. *European Journal of Contraception & Reproductive Health Care* **9**(4), 221–244.

Fu H, Darroch JE, Henshaw SK and Kolb E (1998) Measuring the extent of abortion underreporting in the 1995 National Survey of Family Growth. *Family Planning Perspectives* **30**(3), 128–138.

Groves RM and Khan RL (1979) *Surveys by Telephone: A National Comparison with Personal Interviews*. Academic Press Inc., London.

Gursoy A (1996) Abortion in Turkey: a matter of state, family or individual decision. *Social Science & Medicine* **42**(4), 531–542.

Hammerslough CR (1987) *Correcting Survey-Based Contraceptive Failure Rates for Abortion Under-Reporting*. Princeton University, Princeton.

Holbrook AL, Green MC and Krosnick JA (2003) Telephone versus face-to-face interviewing of national probability samples with long questionnaires. *Public Opinion Quarterly* **67**(1), 79–125.

HUIPS (1994) *1993 Turkey Demographic and Health Survey*. Hacettepe University Institute of Population Studies and Ministry of Health, Ankara.

HUIPS (2004) *2003 Turkey Demographic and Health Survey*. Hacettepe University Institute of Population Studies, European Union and Ministry of Health, Ankara.

HUIPS (2014) *2013 Turkey Demographic and Health Survey*. Hacettepe University Institute of Population Studies, Ministry of Development and TUBITAK, Ankara.

Huntington D, Mensch B and Toubia N (1993) A new approach to eliciting information about induced abortion. *Studies in Family Planning* **24**(2), 120–124.

Jagannathan R (2001) Relying on surveys to understand abortion behavior: some cautionary evidence. *American Journal of Public Health* **91**(11), 1825–1831.

Johnston HB, Edmeades J, Nyblade L, Pearson E, Serbanescu F and Stupp P (2010) Three approaches to improving the use of face-to-face interviews to measure abortion. In Singh S, Remez L and Tartaglione A (eds) *Methodologies for Estimating Abortion Incidence and Abortion-Related Morbidity: A Review*. Guttmacher Institute and International Union for the Scientific Study of Population.

Jones EF and Forrest JD (1992) Underreporting of abortion in surveys of U.S. women: 1976 to 1988. *Demography* **29**(1), 113–126.

https://doi.org/10.1017/S0021932019000397 Published online by Cambridge University Press

Jones RK and Kost K (2007) Underreporting of induced and spontaneous abortion in the United States: an analysis of the 2002 National Survey of Family Growth. *Studies in Family Planning* **38**(3), 187–197.

Keogh SC, Kimaro G, Muganyizi P, Philbin J, Kahwa A, Ngadaya E and Bankole A (2015) Incidence of induced abortion and post-abortion care in Tanzania. *PloS One* **10**(9), e0133933.

Koç I and Saraç M (2017) The family formation process among couples having children with assisted reproductive techniques in Turkey. In Kapella O, Schneider NF, and Rost H (eds) *Familie-Bildung-Migration*. Verlag Barbara Budrich, Berlin.

Kreuter F, Presser S and Tourangeau R (2008) Social desirability bias in CATI, IVR, and web surveys: the effects of mode and question sensitivity. *Public Opinion Quarterly* **72**(5), 847–865.

Krumpal I (2011) Determinants of social desirability bias in sensitive surveys: a literature review. *Quality & Quantity* **47**(4), 2025–2047.

Krysan M and Couper MP (2003) Race in the live and the virtual interview: racial deference, social desirability and activation effects in attitude surveys. *Social Psychology Quarterly* **66**(4), 364–383.

Lara D, Strickler J, Olavarrieta CD and Ellertson C (2004) Measuring induced abortion in Mexico: a comparison of four methodologies. *Sociological Methods & Research* **32**(4), 529–558.

Lee RM (1995) *Doing Research on Sensitive Topics*. Sage, London.

Lensvelt-Mulders G (2008) Surveying sensitive topics. In *International Handbook of Survey Methodology*. Psychology Press, Taylor & Francis Group, New York, pp. 461–478.

London K and Williams L (1990) A comparison of abortion underreporting in an in-person interview and self-administered questionnaire. Presentation at the *Annual Meeting of the Population Association of America*, Toronto, Canada.

MacFarlane KA, O'Neil ML, Tekdemir D and Foster AM (2017) It was as if society didn't want a woman to get an abortion: a qualitative study in Istanbul, Turkey. *Contraception* **95**(2), 154–160.

Magnani RJ, Rutenberg N and McCann HG (1996) Detecting induced abortions from reports of pregnancy terminations in DHS Calendar Data. *Studies in Family Planning* **27**(1), 36–43.

Mavletova A (2013) Data quality in PC and mobile web surveys. *Social Science Computer Review* **31**(6), 725–743.

Mavletova A and Couper MP (2013) Sensitive topics in PC web and mobile web surveys: is there a difference? *Survey Research Methods* **7**(3), 191–205.

Medeiros M & Diniz D (2012) Recommendations for abortion surveys using the ballot-box technique. *Ciência & Saúde Coletiva* **17**(7), 1721–1724.

Mosher WD (1985) Reproductive impairments in the United States, 1965-1982. *Demography* **22**(3), 415–430.

Muchova L (2013) The problems with linking specific foreign policy to abortion in developing countries: critical review of Eran Bendavid, Patrick Avila & Grant Miller, United States aid policy and induced abortion in sub-Saharan Africa. In *World Health Organization Bulletin Online*, 2011. IORG Young Scholars Series the Problems with Linking No. 3.

O'Neil ML (2017) The availability of abortion at state hospitals in Turkey: a national study. *Contraception* **95**(2), 148–153.

O'Neil ML, Aldanmaz B, Quiles RMQ and Kılınc FR (2016) Yasal Ancak Ulasilabilir Degil: Türkiye'deki Devlet Hastanelerinde Kürtaj Hizmetleri [Legal but not accessible: induced abortion services in public hospital in Turkey]. Research conducted by Kadir Has University Istanbul Turkey. https://www.khas.edu.tr/w243/files/documents/abortion-tr.pdf (accessed 25 May 2019).

Ong AD and Weiss DJ (2000) The impact of anonymity on responses to sensitive questions. *Journal of Applied Social Psychology* **30**(8), 1691–1708.

Ozdemir G (2012) *Başbakan Erdoğan: Kürtajı 'cinayet' olarak görüyorum [Prime Minister Erdoğan: I see Abortion as 'Murder']*. http://www.milliyet.com.tr/basbakan-erdogan-kurtaji-cinayet-olarak-goruyorum/siyaset/siyasetdetay/25.05.2012/1545183/default.htm (accessed 31 October 2018).

Potter RG, Ford K and Moots B (1975) Competition between spontaneous and induced abortion. *Demography* **12**(1), 129–141.

Rasinski KA, Baldwin AK, Willis GB and Jobe JB (1994) Risk and loss perceptions associated with survey reporting of sensitive behaviors. Presentation at the *Annual Meeting of the American Statistical Association*, Toronto, Canada.

Rossier C (2003) Estimating induced abortion rates: a review. *Studies in Family Planning* **34**(2), 87–102.

Saraç M and Koç I (2017) Prevalence and risk factors of infertility in Turkey: evidence from demographic and health surveys, 1993-2013. *Journal of Biosocial Science* **50**(4), 472–490.

Scott R and Lindberg L (2016) Measurement and mismeasurement of abortion and other pregnancy outcomes in the national survey of family growth. Presentation at the *Population Association of America Annual Meeting*, Washington, DC.

Senlet P, Cagatay L, Ergin J and Mathis J (2001a) Bridging the gap: integrating family planning with abortion services in Turkey. *International Family Planning Perspectives* **27**(2), 90–95.

Senlet P, Curtis SL, Mathis J and Raggers H (2001b) The role of changes in contraceptive use in the decline of induced abortion in Turkey. *Studies in Family Planning* **32**(1), 41–52.

Shah N, Hossain N, Noonari M and Khan NH (2011) Maternal mortality and morbidity of unsafe abortion in a university teaching hospital of Karachi, Pakistan. *Journal of the Pakistan Medical Association* **61**(6), 582–582.

Stuart GS and Grimes DA (2009) Social desirability bias in family planning studies: a neglected problem. *Contraception* **80**(2), 108–112.

Tennekoon V (2017) Counting unreported abortions: a binomial-thinned zero-inflated Poisson model. *Demographic Research* **36**, 41–72.

Tezcan S and Omran AR (1981) Prevalence and reporting of induced abortion in Turkey: two survey techniques. *Studies in Family Planning* **12**(6/7), 262–271.

Tierney KI (2017) Missing cases: an evaluation of abortion underreporting in add health. Doctoral Dissertation, University of North Carolina at Chapel Hill, Chapel Hill.

Tourangeau R,Rips LJ and Rasinski K (2000) *The Psychology of Survey Response*. Cambridge University Press, Cambridge.

Tourangeau R and Yan T (2007) Sensitive questions in surveys. *Psychological Bulletin* **133**(5), 859–833.

Udry JR, Gaughan M, Schwingl PJ and van den Berg BJ (1996) A medical record linkage analysis of abortion underreporting. *Family Planning Perspectives* **28**(5), 228–231.

USNSFG (2018) *National Survey of Family Growth 2015-2017, Public-Use Data File Documentation*. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Centre for Health Statistics. https://www.cdc.gov/nchs/data/nsfg/NSFG_2015_2017_UserGuide_MainText.pdf (accessed 25 May 2019).

WHO (1987) *Protocol for Hospital-Based Descriptive Studies of Mortality, Morbidity Related to Induced Abortion*. WHO Task Force on Safety and Efficacy of Fertility Regulating Methods. Project 86912. WHO, Geneva.

Zamanian M, Baneshi MR, Haghdoost A and Zolala F (2016) Estimating the visibility rate of abortion: a case study of Kerman, Iran. *BMJ Open* **6**(10), e012761.

Cite this article: Saraç M and Koç İ (2020). Increasing misreporting levels of induced abortion in Turkey: is this due to social desirability bias? *Journal of Biosocial Science* **52**, 213–229. https://doi.org/10.1017/S0021932019000397