International Journal of Community Medicine and Public Health
Cardozo MF et al. Int J Community Med Public Health. 2023 Mar;10(3):1232-1238
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20230645

Original Research Article

Assessment of knowledge, attitude and practices regarding dengue among the general population of Goa

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Received: 20 January 2023
Revised: 16 February 2023
Accepted: 17 February 2023

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ABSTRACT

Background: Dengue is a major health problem in India. The state of Goa has seen a rise in the incidence of Dengue. The study was conducted to understand the knowledge, attitude and practices (KAP) of the people regarding this disease.
Methods: This was a cross sectional descriptive study conducted on a sample of participants of the state of Goa. Data on demographic characteristics and KAP was obtained from participants through Google forms.
Results: A large number of participants had adequate knowledge of the source of infection and even modes of transmission. Knowledge of symptomatology and treatment was seen to be inadequate. Symptoms such as pain behind the eye and abdominal pain were known by less than 33% of the population. 61.84% were aware that dengue is transmitted through *Aedes* mosquito. Knowledge of symptoms and the vector transmitting dengue virus was least among the non-student participants. 44.7% of the participants opined that papaya leaves are beneficial for treatment with a higher proportion among the non-student population. Knowledge of the complications of dengue such as dengue haemorrhagic fever was reported by 56.6% of the population while dengue shock syndrome was reported by 32.3% of the population.
Conclusions: Findings indicate there is lesser knowledge of symptomatology and epidemiology of dengue among the non-student participants compared to the student participants. Educational and health programmes are needed to increase knowledge among the general population, campaigns specifically targeting the non-student population are required.

Keywords: Dengue, Knowledge, Aware

INTRODUCTION

Dengue is a major public health concern throughout tropical and subtropical regions in the world. It is the most rapidly spreading mosquito-borne viral disease, with a 30-fold increase in global incidence over the past 50 years.[1] It's caused by the virus of the Flaviviridae family and there are four distinct but closely related serotypes of the virus that cause dengue (DEN-1, DEN-2, DEN-3 and DEN-4). Dengue can cause a wide range of clinical illnesses ranging from mildly symptomatic dengue fever (DF) to more dangerous clinical conditions with capillary leakage syndrome such as dengue shock syndrome (DSS) and dengue haemorrhagic fever (DHF).[2] Though the incidence of dengue has increased in India over the years, the mortality has decreased. There were 99913 cases of dengue with 220 deaths in the year 2015 with a case fatality ratio of 2.20 and 136422 cases and 132 deaths in 2019 with a case fatality ratio of 0.96.[3]

The state of Goa has seen a surge in the number of cases in recent years. As per the National Vector Borne Disease Control Programme in Goa there were 235 cases in 2017,

335 cases in 2018 and 992 cases in 2019, 376 in 2020, 1073 in 2021.[4]

Dengue morbidity can be reduced drastically by implementing outbreak through coordinated epidemiological and entomological surveillance, promoting the principles of integrated vector management and deploying locally adapted vector control measures including effective urban and household water management. Effective communication can achieve behavioural outcomes that augment prevention programmes. In order to achieve this, understanding the baseline knowledge attitude and practices in the community is of prime importance.

This study was designed with the objective of assessing the knowledge, attitude and practices regarding dengue among the general population in the state of Goa and utilising the information obtained to suggest measures to create awareness about the various preventive measures that can be adopted to control the situation.

METHODS

The study was conducted in the state of Goa, which is the smallest state of India located on the western coast of India. It has a tropical climate and a tourist destination. Goa, being in the tropical zone and near the Arabian Sea, has a hot and humid climate for most of the year.

Study period

This was a cross-sectional, observational study carried out in the month of July 2020, among the Goan population. The data was collected electronically using Google forms. The Google forms were used as the State was facing the COVID-19 pandemic and the electronic data collection was an efficient method to reach out to a larger population using COVID appropriate behaviour.

Sampling method

A total of 650 individuals residing in Goa from age groups 12 and above took part in this survey. The forms were widely disseminated and all people who met the inclusion criteria were allowed to participate.

Sample size

We estimated the sample size to be 600 using the formula given by considering a 95% confidence and a margin of error of 4% assuming a 50% prevalence in the population.

$$n = Z\alpha^2 \times p \times q/d^2$$

Study instruments

An online self-reported questionnaire was designed by the investigators which was pre-tested. The proforma had four sections. The first part consisted of questions on sociodemographic characteristics such as age, gender, marital status, living area and medical background. Second part consisted of questions pertaining to general knowledge of Dengue, the third part relates to the attitude of every individual to dengue. The fourth part of the questionnaire was to record the current practices carried out to prevent the spread of dengue.

Inclusion-exclusion criteria

People who were 12 years and above and residing in the state of Goa willing to participate on a voluntary basis were included in the study. Although there were representatives from all talukas of Goa, more than half 84.8% (n=650) of participants were from the four talukas of Mormugao, Salcete, Bardez, and Tiswadi. The study made attempts to get a representation from all the parts of Goa. However, since we used Google forms, we could only get a representative simple from those who used smartphones. The survey was conducted only in English and only participants who understood the language could participate.

Data collection

The link of a proforma (created using Google forms) was sent through WhatsApp, and other social media links such as Instagram to the study participants. Participants were encouraged to complete the survey. On clicking on the questionnaire link the participants were auto directed to the information about the study and informed voluntary consent. After giving consent and filling up demographic details, questions split into three sections appearing sequentially were answered by the participants. Google form was adopted as a method of data collection due to the ongoing COVID-19 pandemic in the region.

Statistical analysis

Data entry and analysis was done using Microsoft excel 2010. The distribution of responses was presented as frequencies, percentages and graphs.

Ethics

The study proposal was approved by the Institutional Ethics Committee. All data was kept confidential. Informed consent was obtained through Google forms, from participants who were willing to participate in the study.

RESULTS

The study was conducted using Google forms after widely disseminating the link to various parts of the state. A total of 650 people responded to our request. Care was taken to ensure that we had adequate representation from different socio demographic groups in the state of Goa. The results of the study are given below.

Sociodemographic characteristics of the study population

The average age of the study participants was 29.7±13.1 years. Age ranged from 13 to 75. It consisted of 317 (48.7%) males, 333(51.23%) females. The participants were from all twelve talukas of Goa. Majority of the participants were students 341(53.4%) the remaining, henceforth referred to as non-students were 309 (46.6%) which included full time workers 195 (30.0%), part time workers 21 (3.2%), housewives 40 (6.1%) retired 26 (4%) or unemployed 27 (4.1%).

Among the survey participants 48 (7.3%) had contracted dengue in the past and had taken treatment. The average duration of their hospital stay has been 5.4 days. Among the participants infected with dengue, 11 (22.9%) participants had another member who had been infected with dengue. Among the people infected with Dengue 10 (20.8%) had suffered from dengue haemorrhagic fever.

Table 1: Sources of information on dengue among students and non-student participants.

Source of information	Student (%)	Non-student (%)	Total (%)
Internet	293 (75.4)	189 (78.8)	482 (74.1)
TV [local /national]	184 (53.8)	161 (56.6)	345 (53.0)
Government advertising poster	104 (29.7)	104 (39.9)	208 (32.0)
Radio [local/national]	36 (8.75)	42 (20.2)	78 (12.0)
Newspaper [local national]	193 (53.5)	173 (63.5)	366 (56.3)
From health worker	90 (25.5)	73 (26.9)	163 (25.0)
From family	179 (50.4)	124 (45.7)	303 (46.6)
From friends	152 (42.1)	116 (44.7)	268 (41.2)
From school	193 (39.7)	60 (41.3)	253 (38.9)
From college	199 (41.6)	61 (41.3)	260 (40.0)

The numbers in parenthesis indicates percentages

Table 2: Knowledge of the symptoms of dengue among students and non-students.

Symptoms	Student (%)	Non-student (%)	Total (%)
Fever	315 (92.3)	245 (79.2)	560 (86.1)
Sore throat	52 (15.2)	39 (12.6)	91 (14.0)
Joint pain	199 (58.3)	166 (53.7)	365 (56.1)
Breathless	42 (12.3)	31 (10.0)	73 (11.2)
Headache	230 (67.4)	188 (60.8)	418 (64.3)
Vomiting	170 (49.8)	108 (34.9)	278 (42.7)
Appetite	190 (55.7)	113 (36.5)	303 (46.6)
Abdominal pain	112 (32.8)	57 (18.4)	169 (26.0)
Rash	160 (46.9)	99 (32.0)	259 (39.8)
Eye pain	143 (41.9)	72 (23.3)	215 (33.0)
Diarrhoea	68 (19.9)	52 (16.8)	120 (18.4)
Muscle pain	200 (58.6)	150 (48.5)	350 (53.8)

The numbers in parenthesis indicates percentages

Table 3: Knowledge of the vector transmitting dengue among students and non-students.

Criteria	Student (%)	Non-student (%)	Total (%)
Do all mosquitoes transmit Dengue?			
Yes	18 (5.27)	10 (3.2)	122 (18.7)
No	323 (94.7)	299 (96.7)	528 (81.2)
Knowledge of the name of the vector			
Aedes	242 (70.9)	160 (51.7)	402 (61.8)
Others	99 (29.0)	149 (48.2)	248 (38.1)

The numbers in parenthesis indicates percentages

Table 4: Knowledge of attitude of the population towards dengue.

Breeding site	Frequency	Percentage
Water jar	353	58.4
House drains	421	69.7
Flower vase	434	71.9
Tyres	511	84.6
Coconut shells	493	81.6
Water coolers	316	52.3

Table 5: Knowledge of preventive practices followed by the population towards dengue.

Preventive measure	Frequency	Percentage
Cover water containers	460	75.9
Remove standing water	534	88.1
Cutting bushes	214	35.3
Pouring chemicals	245	40.4
Disposing tyres	470	77.6
Disposing garbage	433	71.5
Mosquito repellent	484	80
Changing water in flower pots	404	66.7
Remove water from flower pots	419	69.1
Prevent clogging of drains	406	67
Adding salt to water	54	10.6
Adding oil to water	148	24.4
Having potted plants	53	8.7
Keeping tall grass	16	2.6

Table 6: Knowledge of preventive practices with regards to Dengue infection among student and non-student participants.

Knowledge of preventive measure	Student, frequency n=341	Non-student, frequency n=309	Total (%)
Cover water containers	255 (74.7)	205 (66.3)	460 (70.7)
Remove standing water	309 (90.6)	240 (77.6)	549 (84.4)
Cutting bushes	109 (31.9)	105 (33.9)	214 (32.9)
Pouring chemicals	121 (35.4)	124 (40.1)	245 (37.6)
Disposing tyres	261 (76.5)	209 (67.6)	470 (72.3)
Disposing garbage	252 (73.9)	181 (58.5)	433 (66.6)
Mosquito repellent	277 (81.2)	208 (67.3)	485 (74.6)
Changing water in flower pots	238 (69.7)	161 (52.1)	399 (61.3)
Remove water from flower pots	238 (69.7)	181 (58.5)	419 (64.4)
Prevent clogging of drains	231 (67.7)	175 (56.6)	406 (62.4)
Adding salt to water	33 (9.6)	31 (10.0)	64 (9.8)
Adding oil to water	86 (25.2)	61 (19.7)	147 (22.6)
Having potted plants	39 (11.4)	14 (4.5)	53 (8.1)
Keeping tall grass	09 (2.6)	07 (2.2)	16 (2.4)

The numbers in parenthesis indicates percentages

Table 7: Knowledge and practices regarding complications of Dengue and its treatment.

Criteria	Student (%)	Non-student (%)	Total (%)
Complications			
Bleeding	106 (31.0)	69 (22.3)	175 (26.9)
DHF	205 (60.1)	161 (52.1)	366 (56.6)
DSS	132 (38.7)	78 (25.2)	210 (32.3)
No knowledge	109 (31.9)	126 (40.7)	235 (36.1)

Continued.

Criteria	Student (%)	Non-student (%)	Total (%)
Knowledge on availability of treatment for dengue			
Yes	245 (71.8)	208 (67.3)	453 (69.6)
No	96 (28.1)	101 (32.6)	197 (30.3)
Knowledge on details of dengue treatment			
Antibiotics	76 (22.2)	99 (32.0)	175 (26.9)
Antipyretics	129 (37.8)	80 (25.8)	209 (32.1)
Antimalarial	58 (17.0)	46 (14.8)	104 (16.0)
Pain killers	109 (31.9)	53 (17.1)	162 (24.9)
Papaya leaves	119 (34.8)	138 (44.6)	257 (39.5)
No knowledge	76 (22.2)	67 (21.6)	143 (22.0)
Knowledge about the use of papaya leaves			
Useful	133 (39.0)	158 (51.1)	291 (44.7)
Not useful	08 (2.34)	14 (4.5)	22 (3.3)
No knowledge	200 (58.6)	138 (44.6)	338 (52.0)

The numbers in parenthesis indicates percentages

Table 8: Knowledge of treatment adopted by population in a case of dengue.

Knowledge about treatment	Frequency	Percentage
Antibiotics	175	28.6
Antipyretics	209	34.2
Antimalarials	104	17
Painkillers	162	26.5
Papaya leaves	256	41.9
No knowledge	154	25.2

DISCUSSION

A total of 650 people participated in this cross-sectional online study on the knowledge attitude and practices regarding dengue infection in the state of Goa. The sources of information regarding dengue varied across every age group. Understanding people's perception and their practices could help in identifying target areas and also in formulating strategies to combat these outbreaks.

In this study, there was a variation in terms of sources of knowledge regarding Dengue with the non-student population receiving most of their information from newspapers and government posters. The student participants received most of their knowledge from the internet as well as from college and school, this may be due to the update in the school and college curriculum regarding Dengue as knowledge of the disease and its preventive practices increases along with better dissemination of knowledge.[5]

Although participants were aware of the symptoms of fever (86.1%), headache (64.3%) and joint pain (56.1%), a lower proportion of people were aware of retro orbital pain, rash and abdominal pain. This may lead to delay in seeking medical care. The respondent's knowledge of symptoms was superior when compared to a similar study done in Central India.[6] However it was found to be lower when compared to an identical study done in Malaysia. [7]

About 64.9% of the participants did not know that dengue fever can cause retro orbital pain while only 42.3% of the participants reported the presence of rash as a symptom of dengue. Although the ophthalmic complications of dengue are rare, they have been reported in several studies.[8,9] Having insufficient knowledge of the signs and symptoms of dengue can lead one to confuse dengue fever with other illnesses such as malaria which is common in India.

Knowledge about other important signs such as shock was insufficient. This could indicate that people are not always able to distinguish dengue infection from other diseases. This is a concern, and it needs due attention because by making the community aware of the specific signs and symptoms of dengue, we can expect early health care seeking behaviour for severe cases and provide prompt and timely management. Knowledge of more common symptoms or disease course also needs to be improved as the majority of the respondent's equated fever with dengue. [10]

A smaller fraction of people was aware that dengue can be transmitted by sharing needles or through blood transfusion as compared to a similar study conducted in Jamaica; this would lead to increased transmission of dengue in intravenous drug abusers who share needles.[11]

Less than half the sample population are aware that the mosquito transmitting dengue bites in the daytime this may be because interviewees failed to differentiate between malaria and dengue and incorrectly believed that Aedes mosquito transmits malaria as seen in a similar study conducted in Laos.[12]

The respondents had the knowledge regarding the biting time was day (48.7%) which was higher when compared with the study done Andhra Pradesh (36%) but lower when compared with study done in Punjab (56.15).[13,14]

Although our survey population was able to correctly identify all the major breeding sites for *Aedes*, water coolers which were seen to be prominent breeding sites were least mentioned. Air coolers and cisterns, mostly used by the upper-middle, middle and lower-middle income households; facilitate breeding of mosquitoes because water is stored in the open tanks of the coolers.[15]

Inadequate knowledge of the complications of dengue such as DHF, DSS and bleeding disorders were seen in our survey population even though an overwhelmingly large part of our survey population are aware that dengue is a serious illness.

Even though antipyretics and symptomatic management constitute the mainstay of treatment for Dengue, a large proportion of the people stated that Papaya leaves are the mainstay for treatment of Dengue.

Consensus guidelines for treatment of dengue fever from the World Health Organization and US Centers for Disease Control recommend acetaminophen to manage pain and fever but contraindicate nonsteroidal anti-inflammatory agents (NSAIDs) because of potentially increased bleeding risk, with thrombocytopenia as a complication yet a fragment of the sample population was aware of this.[16]

A large proportion of people felt that they were at risk of getting dengue which can be attributed to the frequent outbreaks of dengue. Goa's tropical climate, migration and its role as a tourist hub, mainly in Madgao, Vasco and Mormugao, the trade and commercial centres being the hubs of people's activity potentiate the formation of epicentres for DEN outbreaks.[17]

People were seen to prefer indoor methods of repellents such as vaporizers as opposed to outdoor methods such as skin creams this might lead to increase in transmission of Dengue as the *Aedes* mosquito bites during the day and using skin creams as well as mosquito nets and insecticide nets are the best way to prevent the disease from occurring.

On comparing the different results obtained from segregating students and non-students there was a significant positive trend in terms of knowledge among the students.

In terms of misconceptions and myths regarding the transmission of Dengue the non-students had significantly more.

A positive attitude towards use of papaya leaves in the treatment of Dengue was seen as the age increases with the highest among the non-student population, this may lead to individuals seeking help from alternative medicine practitioners as well as not taking the allopathic mode of treatment diligently.

Papaya leaf extract is indicated in the management of dengue, however there is need of more evidence in the form of large clinical trials before a decision related to the use of such extract is made.[18]

All the participants from every age group had an equivocal attitude towards the importance of Dengue preventive practices.

The study revealed that the student community were more likely to follow preventive practices when it comes to halting the transmission of Dengue. This may be due to inculcation of correct knowledge and preventive practices at the grassroots level of schools and colleges. This was initiated by the Central Board of Secondary Education which had an 'anti-vector campaign' to promote awareness as well as dissemination of knowledge of preventive practices.[5] It could also be attributed to the consistent behaviour change communication programs through schools and colleges.

In a study carried out in Delhi it was reported that poor knowledge of inhabitants about breeding of dengue vectors, its habitats and preventive measures from mosquito bites are the primary reasons behind dengue outbreak and the strategies like minimizing the breeding potential of *Aedes aegypti*, water management practice by individuals along with implementation of urban bye-laws and IEC activities are necessary for its control.[19] This can be seen among the student population of Goa wherein superior knowledge led to better preventive practices. However, it must be noted that good attitude does not always translate to good practices as noticed in a similar KAP study conducted in Aligarh, India, therefore health promotion activities should be strengthened for improving knowledge, ensuring people are receptive to the messages and make it easier for them to adopt desired change of behaviour.[20]

This study highlighted that the KAP among students and non-students differ wherein knowledge about the vector and the disease was better among the student participants as compared to the non-student population, indicating the need to sustain the gains in the student population and work towards promoting BCC activities among the non-student population under the NVBDCP programme.

CONCLUSION

Dengue is a preventable and a treatable disease. The study showed that many of the participants knew about the disease but the knowledge regarding signs and symptoms was still insufficient. They were aware that dengue can be treated but many still did not know which medicines should be absolutely avoided to prevent any further complications in a patient of dengue. Awareness about preventive measures is present among the participants.

The findings imply that educational and health programmes should focus on enhancing dengue knowledge among the Goans in terms of symptomatology and epidemiology of the disease. More outreach on mosquito control campaigns should be carried out especially targeting the non-student population who had lesser knowledge in key areas as compared to its counterparts. There is scarcity of such studies done in Goa regarding Knowledge attitude and prevention of Dengue and more of these studies need to be carried out. This will highlight the magnitude of knowledge among other population groups and collection of such data can help in identifying the existing gap in the awareness of dengue, its spread, signs and symptoms, treatment and prevention. Community lectures, health campaigns can be organized to dissipate such information. More information can be disseminated through health workers and print media which can reach a wider population.

ACKNOWLEDGEMENTS

The authors would like to thank the participants and the department of community medicine of Goa Medical College for its contribution and support.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. World Health Organization. WHO report on the Global Strategy for dengue prevention and control, 2012–2020. Available at: https://www.who.int/denguecontrol/9789241504034/en/. Accessed on 12 December 2022.
2. Gubler DJ. The changing epidemiology of yellow fever and dengue, 1900 to 2003. Comp Immunol Microbiol Infect Dis. 2004;27:319-30.
3. World Health Organization. 2008. International Health Regulation (IHR). 2005. Available at: who.int/publications/2008/9789241580410_eng.pdf. Accessed on 12 December 2022.
4. National Vector Borne Disease Control Programme. Available at: https://ncvbdc.mohfw.gov.in/. Accessed on 12 December 2022.
5. Central Board of Secondary Education. Campaign for controlling Dengue. Available at: https://www.cbse.gov.in/cbsenew/Examination_Circular/2010/85_CIRCULAR.pdf. Accessed on 12 December 2022.
6. Taksande A, Lakhkar B. Knowledge, Attitude and Practice (KAP) of Dengue Fever in the Rural Area of Central India. Shiraz E-Med J. 2013;13(4):146-57.
7. Selvarajoo S, Liew JWK, Tan W, Lim XY, Refai WF, Zaki RA, et al. Knowledge, attitude and practice on dengue prevention and dengue seroprevalence in a dengue hotspot in Malaysia: A cross-sectional study. Sci Rep. 2020;10:9534.
8. Chan DP, Teoh SC, Tan CS, Nah GK, Rajagopalan R, Prabhakaragupta MK, et al. Ophthalmic complications of dengue. Emerg Infect Dis. 2006;12(2):285-9.
9. Lim WK, Mathur R, Koh A, Yeoh R, Chee SP. Ocular manifestations of dengue fever. Ophthalmology. 2004;111(11):2057-64.
10. Chinnakali P, Gurnani N, Upadhyay RP, Parmar K, Suri TM, Yadav K. High Level of Awareness but Poor Practices Regarding Dengue Fever Control: A Cross-sectional Study from North India. N Am J Med Sci. 2012;4(6):278-82.
11. Shuaib F, Todd D, Campbell-Stennett D, Ehiri J, Jolly PE. Knowledge, attitudes and practices regarding dengue infection in Westmoreland, Jamaica. West Indian Med J. 2010;59(2):139-46.
12. Mayxay M, Cui W, Thammavong S, Khensakhou K, Vongxay V, Inthasoum L, et al. Dengue in peri-urban Pak-Ngum district, Vientiane capital of Laos: a community survey on knowledge, attitudes and practices. BMC Public Health. 2013;13:434.
13. Malhotra V, Kaur P. The Community knowledge, attitude and practices regarding Dengue fever in field practice area of urban training health centre of Patiala. Int J Res Dev Health. 2014;2(1):19-26.
14. Nagoor KDS, Reddy NB, Kahn S, Kalluri R, John K. Knowledge, attitude and practice on dengue fever and its prevention and control measures in urban slums of South India. Int J Comm Med Public Health. 2017;4(8):3013-7.
15. Singh AL, Rahman A. Malaria and Related Environmental Issues in India. A Case Study of Aligarh City. Geo J. 2001;53:89-99.
16. Kellstein D, Fernandes L. Symptomatic treatment of dengue: should the NSAID contraindication be reconsidered? Postgrad Med. 2019;131(2):109-16.
17. Mahadev PV, Fulmali PV, Mishra AC. A preliminary study of multilevel geographic distribution & prevalence of Aedes aegypti (Diptera: Culicidae) in the state of Goa, India. Indian J Med Res. 2004;120(3):173-82.
18. Charan J, Saxena D, Goyal JP, Yasobant S. Efficacy and safety of Carica papaya leaf extract in the dengue: A systematic review and meta-analysis. Int J Appl Basic Med Res. 2016;6(4):249-54.
19. Singh RK, Mittal PK, Yadav NK, Gehlot OP, Dhiman RC. Aedes aegypti indices and KAP study in Sangam Vihar, south Delhi, during the XIX Commonwealth Games, New Delhi, 2010. Dengue Bull. 2011;35:131-40.
20. 20) Abedi AJ, Khan Z, Ansari A, Amir A. Is Knowledge and attitude correlating with practices? A KAP study on dengue fever. J Epidemiol Comm Health. 2011;65(1).

Cite this article as: Cardozo MF, Balaji E, Francis A, Dias A, Dias L. Assessment of knowledge, attitude and practices regarding dengue among the general population of Goa. Int J Community Med Public Health 2023;10:1232-8.