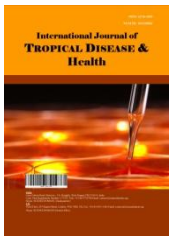

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Completeness of Health Declaration Reports during COVID-19 Pandemic in Ghana: Evidence from Travellers' Surveillance Data, 2020

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Surveillance data completeness and timeliness is critical for effective outbreak response notably in the advent of increasing of infectious diseases of pandemic proportions. Ghana enhanced screening at Points of Entry by intensifying the usage of health declaration forms in response to the emergence of the global threat of COVID-19. Here, we assess the completeness of health declaration form information submitted by travellers and determine predictors of data completeness and demographic variables as a measure to improve data quality at Points of Entry.
Methods: A retrospective cross-sectional study was employed and involved collection of information (age, sex, date of arrival) from the health declaration forms submitted by travellers between the period of March 7-19, 2020 at Ghana's International Airport. Flights which harboured travellers infected with COVID-19 virus and exhibited clinical symptoms prior to or within 2 days

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from the arrival date were included in the analysis. Descriptive analyses were expressed in the form of frequencies and percentages. Association and Regression tests using STATA statistical Package were carried out between travellers' age, sex, nationality, arrival date and form completeness.
Results: A total of 2,374 travellers from 7 flights were included in the study for the period under review. Travellers provided 82.9% and 80.6% complete basic contact and critical information respectively with significant associations between the completeness of travellers' basic contact and critical information and the travellers' age, nationality, and arrival date. Travellers' age, nationality, and date of arrival were found to be strong predictors of completeness of contact and critical information on the health declaration form with younger age categories (<35years) and local nationals were more likely to provide complete health information than older and foreign nationals
Conclusion: Percentage completeness of travellers' health information was appreciable with older persons and foreign nationals less likely to provide incomplete health information. We suggest that efforts to enhance data capture at Points of Entry should prioritize foreign nationals and the aged. Port Health Officials should endeavour to assist/guide foreign nationals and the aged to entirely fill out health declaration forms as a measure to enhance quality and completeness of data for effective disease surveillance.

Keywords: Completeness; Travellers; Information; health; declaration.

1. INTRODUCTION

Surveillance on diseases of public health importance is imperative for providing effective disease control and prevention strategies. Many developing countries especially in sub-Saharan Africa (SSA) fall short of the needed capacity to intense efforts to strengthen disease surveillance systems [1,2]. Many factors may account for this including surveillance data incompleteness which affects data quality for planning and decision-making [3,4]. Challenges in data completeness at health facility and district levels in Ghana have variously been reported [5]. These poor data quality issues have further been worsened by the disease specific programs which continue to rollout parallel surveillance systems leading to overburdening of health personnel. In the current COVID-19 pandemic, the International Health Regulation (IHR) initiated by WHO mandates member nations to ensure health security across borders. The Port Health Unit (PHU) in conjunction with State agencies in Ghana have therefore been involved in rolling out strategies aimed at curbing the spread of the disease at the various point of entries. These measures include enhanced surveillance at all Point of Entries (POE's), which made use of screening of travellers from COVID-19 affected countries mandatory. Ghana recorded the first case of Covid-19 disease in Accra on March 12, 2020, at the Kotoka International Airport. Since then, cases have been reported on daily basis. There is the need to periodically review data at the PHU to ensure efficiency of COVID-19 surveillance reporting at the point of entries. The current study is aimed at profiling the health declaration forms of travellers to determine data completeness and demographic variable predictors of travellers entering the Ghana borders between the period of March 2020. This will help provide informed intervention strategies to control the pandemic.

2. METHODS

2.1 Study Design

This retrospective cross-sectional study involved all travellers who arrived at the Kotoka International Airport from March 2020. All health declaration forms submitted by travellers to the airport were selected. Flights which harboured one or more travellers confirmed to be infected with the virus and declared to have exhibited clinical symptoms prior to or within 2 days from the arrival date were selected. From the selected flights, each traveller's information provided on the health declaration form was collected.

2.2 Data Analysis

The data was digitally collected in Microsoft Excel 2019 (Microsoft company, USA). Data was then cleaned and exported into STATA (version 15) and analysed using socio-demographic characteristics and expressed in a form of frequencies and percentages". Relationships between arrival date and completeness of the form were assessed using linear regression. A Chi-squire test was used to assess for associations between demographic characteristics (age, sex, nationality, flight, and date of arrival) of the travellers and the completeness (providing the contact details and critical information for contact tracing follow-up)

of the health declaration form. Strength of the associations between completeness and each selected characteristic were analysed using a multiple logistic regression analysis with 95% confidence intervals (CI) and p-values <0.05.

3. RESULTS

A total of 2,374 travellers from 7 flights were included in the study between the period of March 7-19, 2020 with the highest number recorded on March 9, 2020 representing 22% of study subjects. Percentage distribution of Ghanaian locals to those with foreign nationalities was equivalent with male travellers' being slightly dominant for the period under review. The age category '35 years and below' formed the dominant (51%) travellers in the study. The socio-demographic information of travellers is presented in Table 1. Over time, the travellers improved in completing both contact and critical information. Specifically, completeness of critical and contact information increased by 0.2% and 3.8% respectively per date of arrival. However, this improvement was only significant for the completeness of critical information [Coef. = 4.81 (0.26-9.36), p=0.04] [Table 2]. Of the 2,374 travellers, 1,969 (82.9%) provided complete contact information per the health declaration forms whilst 1,914 (80.6%) of travellers provided complete critical information on the form. Most travellers provided their contact information with the highest percentage of completeness observed among travellers who arrived on the 18th of March and the lowest percentage among travellers who arrived on the 14th of March [Fig. 1]. Few of the travellers provided all critical information on the form with a highest percentage (82.7%) among travellers who arrived on the 18th of March and the lowest percentage among travellers who arrived on the 7th of March [Fig. 2]. The study found significant associations between the completeness of travellers' basic contact information and the travellers' age, nationality, and arrival date. Travellers under the age of 35 years had the highest percentage (88.0%) of form completeness whilst the lowest (78.0%) was among travellers between 46-56 years of age [Table 3]. Similarly, significant associations were also observed between the completeness of travellers' critical information and the travellers' age, nationality, and arrival dates. Travellers under 35 years of age had the greatest percentage (28.7%) of form completeness whilst the lowest (18.3%) was among travellers older than 56 years [Table 4]. Results identified age, nationality, and date of arrival to be strong predictors of completeness of contact information on the health declaration form after adjusting for covariates. The odds of travellers providing their contact information are 0.35, 0.45, and 0.27 times reduced among persons aging, 35 - 45 years, 46 – 56 years, and >56 years respectively, as compared to individuals aging <35 years [AOR = 0.65 (0.47-0.90); 0.55 (0.40-0.75); 0.73 (0.51-1.03), p<0.01 [Table 5]. Similarly, the results after adjusting for covariates, also revealed age, nationality, airline, and date of arrival to be strong predictors of completeness of critical information on the form. The odds of travellers providing their contact information are 0.28, 0.44, and 0.46 times reduced among persons aging, 35 - 45 years, 46 – 56 years, and >56 years respectively, as compared to individuals aging <35 years [AOR = 0.72 (0.53-0.98); 0.56 (0.41-0.77); 0.54 (0.39-0.75), p<0.01]. The odds of foreigners completing their contact information is 0.28 times reduced as compared to locals [AOR = 0.78 (0.61-0.98), p<0.01] [Table 6].

Socio-demographic characteristics of Travellers

Table 1. Summary of descriptive statistics of travellers

Variables	Frequency	
	n	(%)
Age		
• <35 years	677	(29.2)
• 35-45 years	565	(24.4)
• 46-56 years	569	(24.6)
• 56 years	504	(21.8)
Sex		
• Female	1,001	(42.3)
• Male	1,365	(57.7)

Variables	Frequency	
	n	(%)
Nationality		
• Local	1,160	(49.0)
• Foreigner	1,211	(51.0)
Date of Arrival		
• 3/7/2020	293	(12.4)
• 3/8/2020	269	(11.4)
• 3/9/2020	526	(22.2)
• 3/10/2020	276	(11.7)
• 3/11/2020	72	(3.0)
• 3/12/2020	168	(7.1)
• 3/14/2020	62	(2.6)
• 3/15/2020	236	(10.0)
• 3/16/2020	197	(8.3)
• 3/18/2020	127	(5.4)
• 3/19/2020	140	(5.9)

Table 2. Strength of association between Form Completeness and Arrival Date

Arrival Date	Coefficient	(95% CI)	P-value
Completeness of Contact Information	1.21	(-0.71, 3.14)	0.19
Completeness of Critical Information	4.81	(0.26, 9.36)	0.04*

F (1, 9) = 5.72, R^2. 0.39

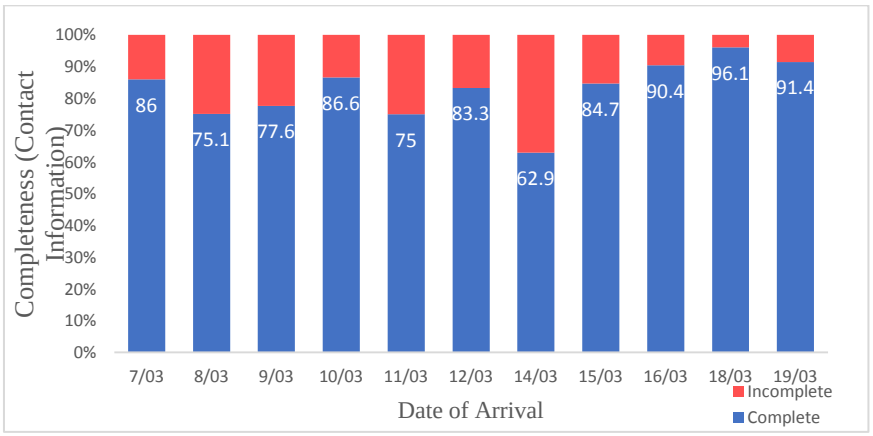

Fig.1. Completeness (Contact Information) of Forms by Date of Arrival

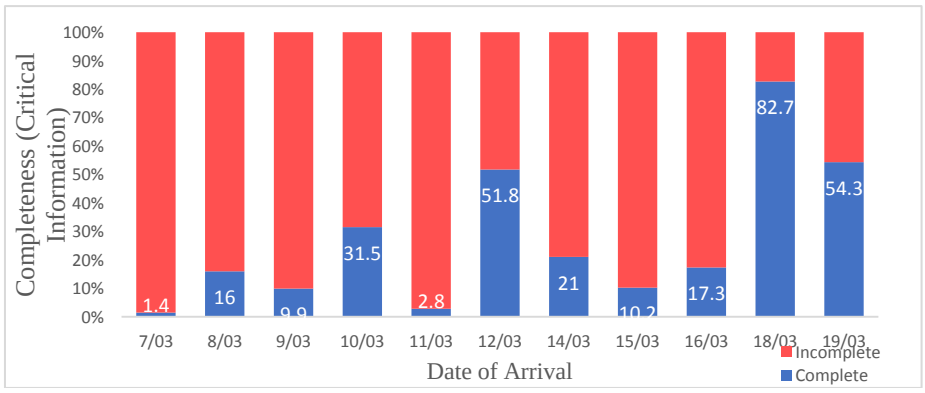

Fig. 2. Completeness (Critical Information) of Forms by Date of Arrival

Table 3. Association between Variables and Form Completeness (Contact Information)

Variables	Critical Information				P-Value
	Complete		Incomplete		
	n	(%)	n	(%)	
Age					**<0.01***
<35years	596	(88.0)	81	(12.0)	
35-45years	463	(82.0)	102	(18.1)	
46-56years	444	(78.0)	125	(22.0)	
>56years	415	(78.6)	89	(21.4)	
Sex					**0.46**
Female	824	(82.3)	177	(17.7)	
Male	1,138	(83.4)	227	(16.6)	
Nationality					**<0.01***
Local	1,031	(88.9)	129	(11.1)	
Foreigner	935	(77.2)	276	(22.8)	
Date of Arrival					**<0.01***
3/7/2020	252	(86.0)	41	(14.0)	
3/8/2020	202	(75.1)	67	(24.9)	
3/9/2020	408	(77.6)	118	(22.4)	
3/10/2020	239	(86.6)	37	(13.4)	
3/11/2020	54	(75.0)	18	(25.0)	
3/12/2020	140	(83.3)	28	(16.7)	
3/14/2020	39	(62.9)	23	(37.1)	
3/15/2020	200	(84.7)	36	(15.3)	
3/16/2020	178	(90.4)	19	(9.6)	
3/18/2020	122	(96.1)	5	(3.9)	
3/19/2020	128	(91.4)	12	(8.6)	

Table 4. Association between Variables and Form Completeness (Critical Information)

Variables	Critical Information				P-Value
	Complete		Incomplete		
	n	(%)	n	(%)	
Age					**<0.01***
<35years	194	(28.7)	483	(71.3)	
35-45years	126	(22.3)	439	(77.7)	
46-56years	108	(19.0)	461	(81.0)	
>56years	92	(18.3)	412	(81.7)	
Sex					**0.46**
Female	231	(23.1)	770	(76.9)	
Male	298	(21.8)	1,067	(78.2)	
Nationality					**<0.01***
Local	311	(26.8)	849	(73.2)	
Foreigner	219	(18.1)	992	(81.9)	
Date of Arrival					**<0.01***
3/7/2020	4	(1.4)	289	(98.6)	
3/8/2020	43	(16.0)	226	(84.0)	
3/9/2020	52	(9.9)	474	(90.1)	
3/10/2020	87	(31.5)	189	(68.5)	
3/11/2020	2	(2.8)	70	(97.2)	
3/12/2020	87	(51.8)	189	(48.2)	
3/14/2020	13	(21.0)	49	(79.0)	
3/15/2020	24	(10.2)	212	(89.8)	
3/16/2020	34	(17.3)	163	(82.7)	
3/18/2020	105	(82.7)	22	(17.3)	
3/19/2020	76	(54.3)	64	(45.7)	

Table 5. Predictors of Form Completeness (Contact Information)

Variables	COR (95% CI)	P-Value	AOR (95% CI)	P-Value
Age		**<0.01***		**<0.01***
<35years	1		1	
35-45years	0.62 (0.45-0.85)		0.65 (0.47-0.90)	
46-56years	0.48 (0.36-0.66)		0.55 (0.40-0.75)	
>56years	0.63 (0.46-0.88)		0.73 (0.51-1.03)	
Sex		**0.50**		**-**
Female	1		-	
Male	1.08 (0.87-1.34)		-	
Nationality		**<0.01***		**<0.01***
Local	1		1	
Foreigner	0.42 (0.34-0.53)		0.44 (0.34-0.55)	
Date of Arrival		**<0.01***		**<0.01***
3/7/2020	1		1	
3/8/2020	0.49 (0.32-0.75)		0.42 (0.27-0.66)	
3/9/2020	0.56 (0.38-0.83)		0.56 (0.38-0.84)	
3/10/2020	1.05 (0.65-1.70)		0.99 (0.60-1.63)	
3/11/2020	0.49 (0.26-0.91)		0.40 (0.21-0.77)	
3/12/2020	0.81 (0.48-1.37)		0.76 (0.44-1.29)	
3/14/2020	0.28 (0.15-0.51)		0.25 (0.13-0.48)	
3/15/2020	0.90 (0.56-1.47)		0.85 (0.52-1.40)	
3/16/2020	1.52 (0.86-2.71)		1.15 (0.64-2.08)	
3/18/2020	3.97 (1.53-10.30)		3.17 (1.21-8.31)	
3/19/2020	1.74 (0.88-3.42)		1.33 (0.65-2.72)	

**CI = Confidence Interval *COR = Crude Odds Ratio *AOR = Adjusted Odds Ratio*

Table 6. Predictors of Form Completeness (Critical Information)

Variables	COR (95% CI)	P-Value	AOR (95% CI)	P-Value
Age		**<0.01***		**<0.01***
<35years	1		1	
35-45years	0.71 (0.55-0.93)		0.72 (0.53-0.98)	
46-56years	0.58 (0.45-0.76)		0.56 (0.41-0.77)	
>56years	0.56 (0.42-0.74)		0.54 (0.39-0.75)	
Sex		**0.68**		**-**
Female	1		-	
Male	0.93 (0.75-1.13)		-	
Nationality		**<0.01***		**0.04***
Local	1		1	
Foreigner	0.60 (0.49-0.73)		0.78 (0.61-0.98)	
Date of Arrival		**<0.01***		**<0.01***
3/7/2020	1		1	
3/8/2020	13.75 (4.86-38.86)		13.43 (4.72-38.21)	
3/9/2020	7.93 (2.84-22.14)		8.52 (3.04-23.85)	
3/10/2020	33.26 (12.01-92.13)		34.47 (12.40-95.88)	
3/11/2020	2.06 (0.37-11.50)		2.08 (0.37-11.65)	
3/12/2020	77.60 (27.65-217.82)		75.74 (26.92-213.07)	
3/14/2020	19.17 (6.00-61.20)		19.86 (6.19-63.68)	
3/15/2020	8.18 (2.80-23.92)		8.12 (2.77-23.79)	
3/16/2020	15.07 (5.25-43.22)		13.54 (4.70-39.00)	
3/18/2020	344.83 (116.11-1024.08)		333.27 (111.60-995.25)	
3/19/2020	85.80 (30.29-243.04)		81.20 (28.44-231.83)	

**CI = Confidence Interval *COR = Crude Odds Ratio *AOR = Adjusted Odds Ratio*

4. DISCUSSION

4.1 Summary of Study Findings

Following the advent of the global threat of COVID-19, countries became increasingly cognizant of the importance of timely, complete reporting and the need for global collaboration in controlling infectious diseases. In resource poor settings like Sub-Saharan Africa where the majority of index cases were travellers from COVID-19 infected countries, passenger 'variables' at various points of entry is important to understanding the quality of data received to measure disease incidence and develop interventions to improve population health. This is one of the few studies of its kind conducted in Ghana on the reporting completeness of health data at the national level. Data completeness of health declaration forms submitted by travellers stratified by age, sex, nationality and date of arrival were analysed for Ghana's international airport after the country recorded her first case of COVID-19 on March 12, 2020.The results of the retrospective analyses revealed that; travellers provided 82.9% and 80.6% complete basic contact and critical information respectively with significant associations between the completeness of travellers' basic contact and critical information and the travellers' age, nationality, and arrival date. Travellers' age, nationality, and date of arrival were found to be strong predictors of completeness of contact and critical information on the health declaration form.

4.2 Completeness of Health Declaration Forms among Travellers

The importance of data quality at designated points of entry is critical to enhancing response to diseases of pandemic proportions like COVID-19. Data completeness as a component of data quality is necessary for case profiling and contact tracing in infectious disease outbreaks. Our study revealed that a higher percentage of travellers (> 80%) provided basic and critical information with completeness of critical information significantly increasing by 3.8% [Coef. = 4.81(0.26-9.35), p=0.04] respectively which may be triggered by intensified health education and awareness among travellers at the point of entry as highlighted in a number of studies [6]–[8].

4.3 Associations between Variables and Completeness of Health Declaration Forms

Significant associations were observed between the completeness of travellers' basic contact and critical information and the travellers' age, nationality, and arrival date. Younger age categories were associated with greater form completeness than older age categories, an observation which highlights the role of health authorities in enhancing surveillance data completeness. There is the need for health officials at various points of entry to assist the elderly in providing comprehensive/exhaustive information as required in the health declaration forms. A lower percentage of foreign nationals providing exhaustive health information brings to bare the level of effort that should be put in guiding and ensuring foreign nationals in filling health declaration forms at the designated points of entry.

4.4 Predictors of Form Completeness (Contact & Critical Information)

Traveller's age, nationality, and date of arrival were found to be strong predictors of completeness of contact and critical information on the health declaration form. Even though a number of studies have demonstrated high health seeking behaviour among the elderly [9]–[11] than in young adults, persons that belonged to older age categories were more likely to provide incomplete health information, factors such as higher education or health literacy in younger age groups which have been demonstrated in other studies [12], [13] may account for this observation. Very few or no studies have documented health literacy among foreign nationals and locals, our study which did not explore factors influencing the data completeness of foreign nationals only revealed that the odds of foreigners completing their contact information is 56% reduced as compared to locals (Ghanaians) [AOR = 0.44 (0.34-0.55), p<0.01]. Factors such as language barrier (variation between language used on health declaration form and that spoken by foreign locals), low health literacy and poor adherence to health directives at points of entry. The observation that travellers who arrived at a later date (March 16 – 19, 2020) were more likely to present complete health information as compared to travellers who arrived prior to the aforementioned dates may broadly be attributable to scaled up surveillance and health education and awareness at points of entry

5. CONCLUSION AND RECOMMENDATIONS

The study established that percentage completeness of traveller's health information

was appreciable (82.9% and 80.6% complete basic contact and critical information respectively) with significant associations between the completeness of information and age, nationality, and arrival date. Travellers' age, nationality, and date of arrival were subsequently found to be determinants of completeness of contact and critical information on the health declaration form. We suggest efforts to enhance data capture at points of entry with priority given to foreign nationals and the aged. Port Health Officials should endeavour to assist/guide foreign nationals and the aged to entirely fill out health declaration forms as a measure to enhance quality and completeness of data for effective disease surveillance.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Approval for access to existing data on health and flight records of travellers was obtained from the Disease Surveillance Department of the Ghana Health Service.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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